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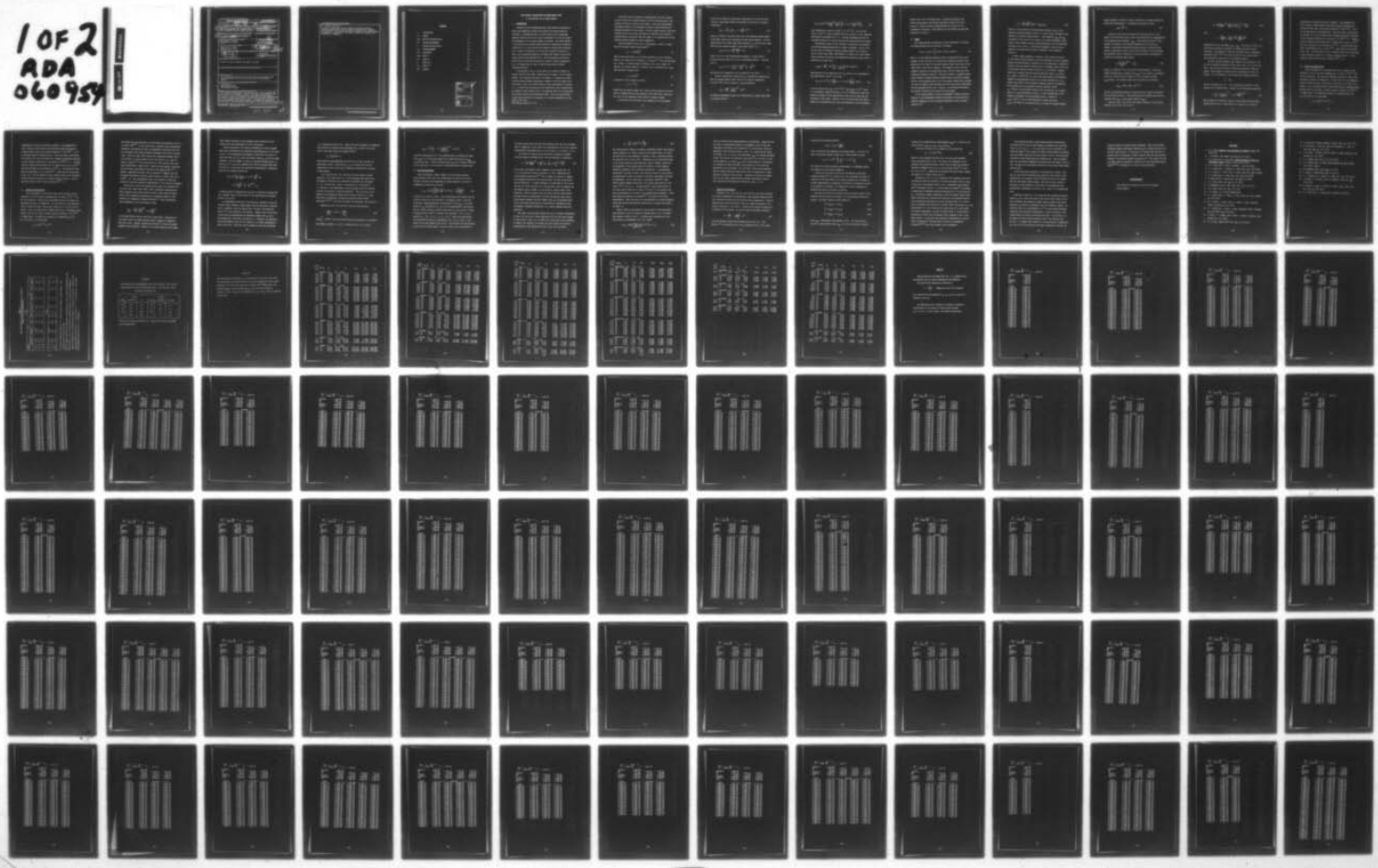

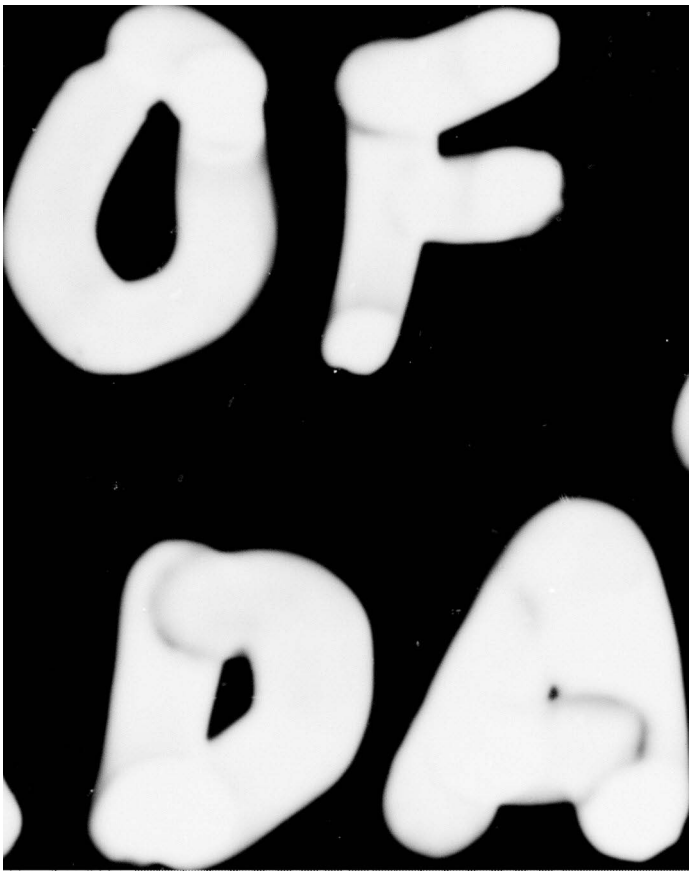
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The frequency distributions of the first six Lyman lines of hydrogen-like carbon, oxygen, neon, magnesium, aluminum, and silicon ions broadened by the local fields of both ions and electrons are calculated for dense plasmas. The electron collisions are treated by an impact theory allowing (approximately) for level splittings caused by the ion fields, finite duration of the collisions, and screening of the electron fields. Ion effects are calculated in the quasistatic, linear Stark-effect approximation, using distribution functions → next page

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20. Abstract (Continued)

of Hooper and Tighe which include correlation and shielding effects. Theoretical uncertainties from the various approximations are estimated, and the scaling of the profiles with density, temperature and nuclear charge is discussed. A correction for the effects caused by low frequency field fluctuations is suggested.

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STARK PROFILE CALCULATIONS FOR LYMAN SERIES LINES OF ONE-ELECTRON IONS IN DENSE PLASMAS

I. INTRODUCTION

Interest in Stark broadened spectral lines emitted or absorbed by dense high temperature plasmas arises mainly from three classes of problems. In conjunction with a reliable theory of the broadening, measured profiles can first be used to determine one of the most important parameters of the plasma, namely its density. The theory applied in the present work actually yields profiles of absorption and emission coefficients (or cross sections) for plasmas in which Stark broadening due to thermal fluctuations of the electric microfield dominates all other line broadening mechanisms, including Stark effects arising from plasma waves and microinstabilities. The corresponding restrictions must be kept in mind when applying this method of density diagnostics, e.g., to plasmas used in laser or particle-beam fusion research (imploding pellets).

A second major class is the calculation of radiative transfer in stellar interiors and, again, imploding pellet plasmas. For such applications, one is mainly interested in the behavior of absorption coefficients at large frequency separations, compared to the half width, from line center. Also, since Stark profiles follow approximately an inverse 2.0 - 2.5 power law as function of this separation, Stark broadening may be dominant in this context even in circumstances where the corresponding half width is smaller than the Doppler width. This can happen because thermal Doppler profiles are Gaussian, i.e., decay exponentially on the wings of the lines.

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The third class of problems is concerned with turbulent plasmas, in which fields from strongly excited collective modes may have a substantial influence on spectral line shapes. Appropriate measurements and analysis enable one to determine electrical energy densities and dominant frequencies in such cases. We shall assume, however, that wave-produced fields are of minor importance in comparison with particle-produced fields, and merely refer the reader to an introduction[1] to this rapidly developing method of plasma diagnostics.

Particle-produced fields are, on the average, a factor ~3 larger than the Holtsmark normal fieldstrength[1,2]

$$F_p = 2.603 p e N_p^{2/3} \quad . \tag{1}$$

This is very nearly equal to the field produced by an ion of charge p which is at a mean ion-ion distance $r_p = (4\pi N_p/3)^{-1/3}$ from the perturbed ion. Since in a neutral plasma containing, e.g., only a single ion species, the electron density is related to the ion density by $N = pN_p$, the electronic Holtsmark field

$$F_0 = 2.603 e N^{2/3} \tag{2}$$

is related to that produced by ions by

$$F_0 = p^{-1/3} F_p . \tag{3}$$

Except for very highly charged ions, typical fields produced by the two kinds of charged particles are therefore of the same order, and we may use, say, $5F_0$ for estimating Stark effects in thermal plasmas.

To the extent that the actual time dependence of the perturbing

fields can be neglected (quasistatic approximation, see the following section), linear Stark shifts are therefore of the order[3] (in angular frequencies)

$$\Delta\omega_S \approx 5 \frac{n^2}{z} a_0 \frac{e}{\hbar} F_0 \approx 13 \frac{n^2 \hbar}{zm} N^{2/3} , \tag{4}$$

where $a_0 = \hbar^2/me^2$ is the Bohr radius and n the principal quantum number of the upper state of the radiating ion with nuclear charge z. For the Stark effect to be linear rather than quadratic, $\Delta\omega_S$ must be much larger than the fine structure spread[3] of the upper states, i.e.,

$$\Delta\omega_S \gg \Delta\omega_F \approx \frac{mc^2}{2\hbar} \frac{(\alpha z)^4}{n^4} (n-1) \tag{5}$$

(Here $\alpha \approx 1/137$ is the fine-structure constant.) We may define a critical electron density N_F by the corresponding equality. This density is

$$N_F \approx 8 \times 10^{-3} \left(\frac{\alpha}{a_0}\right)^3 \left(\frac{z}{n}\right)^{15/2} \left(1 - \frac{1}{n}\right)^{3/2} \tag{6}$$

and must be well exceeded for our calculations to be valid.

Another characteristic density, N_D, is obtained by comparing $\Delta\omega_S$ with the thermal Doppler width, which is for typical temperatures $kT \approx \frac{1}{8} mc^2 (\alpha z)^2$ and ion masses $m_z \approx 2zm_H$ estimated by

$$\Delta\omega_D \approx \frac{mc^2}{8\hbar} \left(\frac{m}{zm_H}\right)^{1/2} (\alpha z)^3 . \tag{7}$$

For density measurements based on our calculations, a second lower limit is therefore given by

$$N_D \approx (104\alpha)^{-3/2} \left(\frac{m}{zm_H}\right)^{3/4} \left(\frac{\alpha}{a_0}\right)^3 \frac{z^6}{n^3} \approx 5 \times 10^{-3} \left(\frac{\alpha}{a_0}\right)^3 \frac{z^{21/4}}{n^3} , \qquad (8)$$

again expressed in terms of $(\alpha/a_0)^3 \approx 3 \times 10^{18}$ cm^{-3}. We also note $N_D/N_F \approx (n^2/z)^{9/4}$, which indicates that fine structure is more important than Doppler broadening for $n^2 \leq z$. (Natural broadening need not be considered because it is always less than the fine-structure splitting.)

High density limits for the validity or usefulness of the present calculations might be expected from a number of sources. First of all, for the lines of different principal quantum numbers not to overlap and the linear Stark effect approximation to remain valid, Stark shifts should certainly be smaller than separations between the upper level in question and the next level,

$$\omega_{n+1} - \omega_n = \frac{mc^2}{2\hbar} (\alpha z)^2 \left[\frac{1}{n^2} - \frac{1}{(n+1)^2}\right] \approx \frac{m}{\hbar} c^2 (\alpha z)^2 n^{-3} . \qquad (9)$$

Near-equality of this separation with $\Delta\omega_S$ from Eq. (4) corresponds to the Inglis-Teller limit,[4] in our case

$$N_{IT} \approx 2 \times 10^{-2} a_0^{-3} \frac{z^{9/2}}{n^{15/2}} \approx 1.5 \times 10^{23} \frac{z^{9/2}}{n^{15/2}} \ [\text{cm}^{-3}] . \qquad (10)$$

As can be seen from $N_{IT}/N_D \approx 10^7 z^{-3/4} n^{-9/2}$ and $N_{IT}/N_F \approx 10^7 z^{-3}$, there is a considerable range (by factors 10^3 to 10^5) between the lowest densities of interest and the Inglis-Teller limit for the lines and ions considered in this paper. However, it is not obvious that this entire range can be explored with the usual approximations of Stark broadening

theory, which will be discussed next. Limitations imposed by the various approximations are further discussed in Section III and in Section IV, where we present quantum-theoretical results for the broadening by electrons. Stark profiles and line widths are given and discussed in Section V.

II. THEORY

As in many previous calculations of Stark broadening,[1] we use the following expression for the spectral line shape,

$$L(\Delta\omega) = -\frac{1}{\pi} \text{Re Tr} \int_0^\infty dF\, W(F)\, \{D[i\Delta\omega - iCF + \phi]^{-1}\} \,. \qquad (11)$$

Here $\Delta\omega$ is the frequency separation from the unperturbed line, Re indicates the real part and Tr the trace over unperturbed states of the radiating ion for which the principal quantum number equals that of the upper state of the line in question. The integral is over the field strength F produced by the perturbing ions, with W(F) being the corresponding distribution function.[5] The dipole operator D generates appropriate products of matrix elements between states of principal quantum number n and the ground state, and C is an operator whose matrix elements (in terms of parabolic wave functions) are the linear Stark coefficients for the components of the line. Finally, ϕ is an operator describing the effects of electron collisions on the line shape.

To the leading orders in both the perturbation (Dyson series) expansion for the (perturbing) electron-(radiating) ion system and the multipole expansion for the interaction Hamiltonian, this collision operator is[1,6]

$$\phi = -\frac{4\pi}{3v} N \left(\frac{\hbar}{m}\right)^2 \underset{\sim}{R}\cdot\underset{\sim}{R}\ \ell n\ (\rho_{max}/\rho_{min}) \qquad (12)$$

where v is the velocity of the perturbing electrons, and $\underset{\sim}{R}$ is the (radiator) electron position operator (in atomic units) operating in the subspace of principal quantum number n. The quantities ρ_{max} and ρ_{min} correspond to the limits of the integral over impact parameters, which arises in the straight classical path approximation (for the perturbing electrons) used in Ref. 6. (The impact parameters ρ were of course assumed to be larger than the radial coordinate of the radiating electron.)

At small impact parameters, curvature of the classical path due to the strong Coulomb interaction with the radiating ion may be important. Because the dipole-monopole interaction can now change sign, a hyperbolic classical path calculation[7] actually gives a convergent result from which an equivalent (Coulomb) cutoff follows as $\rho_c \approx (z-1)e^2/mv^2$. However, since this is smaller than the excited state Bohr radius, $\rho_n \approx n^2 a_0/z$, by a factor $\sim (ze^2/n^2\hbar v)^2 \leq 1$, other than dipole terms in the multipole expansion (and penetrating orbits) will be very important for $\rho \approx \rho_c$. Higher order terms in the perturbation expansion must be considered as well, giving rise to an equivalent (strong collision) cutoff $\rho_s \approx n^2\hbar/zmv$ in the straight classical path calculations, to be supplemented by a quantum-mechanical cutoff $\rho_q \approx \hbar/mv$ corresponding to the DeBroglie wavelength of the perturbing electron. Because of $\rho_s/\rho_n = e^2/\hbar v < 1$ for our high temperature plasmas and, even, $\rho_q/\rho_n = ze^2/n^2\hbar v \leq 1$ we conclude that ρ_n is always the largest minimum

impact parameter for typical electron velocities in plasmas emitting the lines under consideration. We therefore provisionally choose

$$\rho_{min} = \frac{n^2}{z} \, a_0 \, . \tag{13}$$

Corrections and errors associated with this choice will be discussed in the following section, and we now proceed with the determination of the maximum impact parameter, ρ_{max}. Three physical effects[1,8] were ignored in arriving at the divergent expression for the collision operator: correlations between perturbing electrons, splitting of the levels by quasistatic fields, and the finite duration of the collisions. The equivalent cutoff accounting for electron-electron correlations is close to the (electron) Debye radius,

$$\rho_D = \left(\frac{kT}{4\pi Ne^2} \right)^{1/2} \approx \frac{v}{\omega_p} \, , \tag{14}$$

where $\omega_p = (4\pi Ne^2/m)^{1/2}$ is the electron plasma frequency. The quasistatic splitting may be allowed for by $\rho_{max} \approx v/\Delta\omega_s$ with $\Delta\omega_s$ estimated by Eq. (4), while the finite duration of the collisions requires $\rho_{max} \leqslant v/|\Delta\omega|$. The combined effects are accounted for by choosing

$$\rho_{max} = v(\omega_p^2 + \Delta\omega_s^2 + \Delta\omega^2)^{-1/2} \, , \tag{15}$$

and the corresponding theoretical uncertainties will again be discussed in the following section. (Since deviations from straight paths are not important near ρ_{min}, we may neglect them for ρ_{max}.)

From Eqs. (12), (13) and (15) the Maxwell average of the collision operator is as in Eq. (29) of ref. 6

$$\phi \approx -\frac{4\pi}{3}\left(\frac{2m}{\pi kT}\right)^{1/2} N\left(\frac{\hbar}{m}\right)^2 \underset{\sim}{R}\cdot\underset{\sim}{R}\left(\frac{1}{2}\int_y^\infty e^{-x}\,\frac{dx}{x}\right). \tag{16}$$

with

$$y = \frac{mv^2_{min}}{2kT} \approx \left(\frac{\hbar n^2}{2z}\right)\frac{\omega_P^2 + \Delta\omega_S^2 + \Delta\omega^2}{E_H kT} \tag{17}$$

determined from the requirement $\rho_{max} > \rho_{min}$. (We use $E_H = e^2/2a_0$, i.e., the ionization energy of hydrogen, to combine the various atomic constants.) The fraction of electrons excluded by this requirement is estimated[9] by $\frac{4}{3}\pi^{-1/2}y^{3/2}$ and must be small for our calculations of the broadening by electrons to be reasonably accurate.

The most important quantity that remains to be determined is the ion field strength distribution function W(F) in Eq. (11) for the line shape. We have used distribution functions calculated by Tighe and Hooper,[5] which depend on electron and ion densities and on the ion charges. It is convenient to use reduced field strengths defined by

$$\beta = F/F_0$$

with F_0 according to Eq. (2). The β distribution, besides on ionic charges and ion density ratios, depends on the dimensionless parameter

$$a = \frac{r_0}{\rho_D} \approx \left(\frac{e}{F_0\rho^2_D}\right)^{1/2} \approx 2.2\left(\frac{e^2N^{1/3}}{kT}\right)^{1/2}. \tag{19}$$

This parameter is primarily a measure of how strongly coupled singly charged particles are. (Note that $a^2/3 = e^2/r_0kT$ is the ratio of

characteristic potential and kinetic energies.) The parameter $\bar{a}$ is also a measure of the relative contributions of wave- and particle-produced fields, their ratio being estimated by[1] $0.17a^{1/2}/\bar{p}^{1/3}$, if $\bar{p}$ is the mean charge of perturbing ions. Since only static correlations are allowed for in the calculated field strength distribution functions, we must certainly restrict our calculations to $a^{1/2}/\bar{p}^{1/3} \leq 1$. However, since for fixed electron density the ion Debye radius scales as $(\bar{p})^{-1/2}$ and since the mean ion-ion separation is $\bar{p}^{1/3} r_0$, the generalized parameter corresponding to $\bar{a}$ is a factor $\bar{p}^{5/6}$ larger than the value given by Eq. (19). For the modified cluster expansion used in the calculation of the distribution function to converge rapidly one would, a priori, therefore expect the more severe constraint $a\bar{p}^{5/6} < 1$.

III. ERRORS AND RESTRICTIONS

The two parameters in our problem that should be small are the quantities y for the electron broadening and, at least, $a^{1/2}/\bar{p}^{1/3}$ for the ion broadening. They are both increasing functions of density and decreasing functions of temperature. For any given ion, the temperature range is relatively small, and we shall simply use $kT = \frac{1}{4} z^2 E_H$ in this section. Also, the Inglis-Teller estimate should give a reasonable upper density limit for the lines to remain discrete, provided $0.17a^{1/2}/\bar{p}^{1/3}$ is indeed small. To verify this condition, we substitute N_{IT} from Eq. (10) into Eq. (19) and obtain

$$a \leq 3\,(zn^5)^{-1/4} \leq z^{-1/4} .$$

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$$a \leq 3\,(zn^5)^{-1/4} \leq z^{-1/4} .$$

The omitted wave contributions to the microfield are therefore for $\bar{p} \approx z$ of order $0.2/\bar{p}^{11/24}$ or less, and we may conjecture that corresponding theoretical uncertainties in the ion broadening calculations are $\leq 10\%$ for the Lyman-α lines (and the highest densities) and $\leq 5\%$ for the other lines. Should the wave fields exceed their appropriate thermal levels or act mostly on a small portion of the line profile, e.g., near the center of Lyman α[10,11] (see also Section V), their omission here would cause proportionally larger errors. Equally serious appears, especially for the α-lines, the possible violation of the constraint $\bar{a}\bar{p}^{5/6} < 1$. However, comparison with Monte Carlo calculations[12] suggests that the calculated distribution functions remain accurate to better than 10% up to $\bar{a}\bar{z}^{5/6} \approx 2$. The corresponding limit on the density is often more restrictive than that imposed by approximations in the electron broadening.

Other errors in the ion broadening calculations are connected with the use of the linear Stark effect, dipole interaction approximations. While quadratic Stark effects should be small, except near the Inglis-Teller limit, quadrupole interactions are important already at lower densities, as emphasized by Demura and Sholin.[13] These interactions cause asymmetries in the line shapes of order

$$\frac{\rho_n}{r_0} = \frac{n^2 a_0}{z}\left(\frac{F_0}{e}\right)^{1/2} \leq 0.4\left(\frac{z}{n}\right)^{1/2}$$

if the Inglis-Teller limit is used for an upper bound. Especially for the Lyman-α lines, one might therefore expect substantial asymmetries from this source. However, detailed calculations[13] of the ion-produced asymmetry yield additional factors ≤ 0.3 so that omission of the higher

order effects discussed in this paragraph should generally be less serious than other uncertainties in our calculations.

Before proceeding to the electron broadening, we wish to suggest that errors introduced by the quasistatic approximation per se are small as well. The corresponding ion-dynamical corrections[1] are likely to occur only near $\Delta\omega \approx \omega_{Pi}$ from line center, where ω_{Pi} is the ion plasma frequency. For the plasmas to which our calculations might apply, we have $\omega_{Pi} \approx 10^{-2}\ \omega_p$, and by comparing this with the average Stark shift from Eq. (4), we find that the quasistatic approximation is reasonably valid for all densities fulfilling

$$N \gg 10^{-9}\ \frac{z^6}{n^{12}}\left(\frac{\alpha}{a_0}\right) \approx 2 \times 10^{-5}\ \frac{z^{3/4}}{n^9}\ N_D$$

$$\approx 10^{-7}\ \frac{z^{-3/2}}{n^{9/2}}\ \left(1 - \frac{1}{n}\right)^{-3/2}\ N_F\ ,$$

a criterion which is therefore well met for all densities exceeding the low - density limits for the utility of our calculations as estimated by Eqs. (6) and (8).

A corresponding criterion for the electrons, obtained by using the electron plasma frequency, might suggest that the quasistatic approximation is reasonably valid for them as well, in spite of an additional factor 10^6 in the condition on the density. However, most contributions to the field are characterized by frequencies higher than ω_p, and a more quantitative criterion is called for or, conversely, an examination of the high density limit for the validity of the impact approximation used in this work. This limit must be imposed to meet the requirement

$y \leq 1$ discussed below Eq. (17). Since we are not interested in frequencies which exceed the inherent level splittings, Eqs. (19) and (17) can be used to find that y-values of interest fulfill

$$y \leq z^2 E_H / n^2 kT \leq 1,$$

unity actually being approached only for the Ly-α lines and near the Inglis-Teller limit. (Note that $\omega_p < \Delta\omega_s$ is always true near the Inglis-Teller limit so that $\Delta\omega_s$ is indeed the characteristic frequency in this regime.)

It is clear from Eq. (16), that the collision operator becomes sensitive to the actual value of y as this parameter approaches unity. We therefore restricted our calculations by imposing the requirement $y \leq 0.1$, in which case a factor 2 uncertainty in y corresponds to $\sim \pm 30\%$ error in the approximate collision operator while the excluded fraction of electrons is entirely negligible. This restriction alone prevents our reaching the Inglis-Teller limit by factors ≤ 10, a gap that could be narrowed by a (much more involved) unified theory calculation.[5,14,15] [See also the remarks following Eqs. (24) and (25).]

Comparison of Eqs. (12) and (16) allows the identification

$$\frac{\rho_{max}}{\rho_{min}} \approx y^{-1/2} \approx \frac{L_{max}}{L_{min}} \tag{20}$$

using $\int_y^\infty e^{-x} dx/x \approx \ell n(1/y)$ and replacing impact parameters by (dimensionless) angular momenta, $L = m\rho v/\hbar$. According to Eq. (13), we have

$$L_{min} \approx \frac{n^2}{z} \frac{\hbar v}{2} = n^2 \left(\frac{mv^2}{2z^2 E_H} \right)^{1/2} \approx 0.5\, n^2. \qquad (21)$$

Given the restriction $y \leq 0.1$, we therefore need to consider only cases with $L_{max} \geq 1.5\, n^2$ and should expect the largest total error if L_{max} is near this limit. (Errors connected with ρ_{min} will be almost eliminated by the modification in the electron broadening operator discussed next).

IV. ELECTRON BROADENING

Since the diagonal matrix elements of the collision operator equal one half to the total rate coefficients for electron ion (non-Coulomb) collisions, the approximate collision operator in Section II corresponds to total cross sections[1]

$$\sigma_{n\ell} = 6\pi a_0^2 \left(\frac{2E_H}{mv^2} \right) \left(\frac{n}{z} \right)^2 (n^2 - \ell^2 - \ell - 1) \ln\left(\frac{L_{max}}{L_{min}} \right). \qquad (22)$$

if the ion is in the n,ℓ level. This semiclassical cross section for the 2p and 4p levels of O VIII and AℓXIII is compared in Table I with distorted wave (quantum-mechanical) calculations,[16] with $L_{max} = 20$ in both cases and L_{min} according to Eq. (12) for the semiclassical cross section. The last column contains a modified semiclassical cross section, in which a strong-collision term[1,6] is added to the logarithm. [$\ln(\ldots)$ is replaced by $C_n + \ln(\ldots)$, $C_2 = 1.5$, $C_4 = 0.75$.] After this modification the distorted-wave result is represented by Eq. (22) to within $\sim 10\%$, except for the high energy values for 2p. The distorted wave calculations as such should be almost exact, since all partial wave contributions to

the cross section stay well below the unitarity limit and since exchange, which is neglected, is not likely to be important for total cross sections. (Corresponding calculations for n = 3 and 5 give $C_3 = 1.0$ and $C_5 = 0.5$.)

To account for strong (close) collisions, the Maxwell-averaged collision operator estimated by Eq. (16) can therefore be replaced by

$$\phi = -\frac{4\pi}{3}\left(\frac{2m}{\pi kT}\right)^{1/2} N\left(\frac{\hbar}{m}\right)^2 \underset{\sim}{R}\cdot\underset{\sim}{R}\left(C_n + \frac{1}{2}\int_y^\infty e^{-x}\frac{dx}{x}\right) \qquad (23)$$

and at least the diagonal matrix elements for the p states may, for $y < 0.1$, be expected to have an accuracy of $\sim 20\%$. Comparisons with close-coupling calculations[17,18] for 2p states of HI and He II support this estimated accuracy for the Lyman-α lines, for which these states are most important. It seems reasonable to assume that Eq. (23) can be used for all levels involved in our calculations, both for diagonal and off-diagonal matrix elements (in the parabolic quantum number representation). While we suspect that the strong collision terms adopted here may lead to an overestimate for these off-diagonal dipole-interaction matrix elements, one must remember that the corresponding error in the calculated profiles may be counteracted by contributions from off-diagonal quadrupole-interaction, etc., matrix elements which were neglected.

The reader may also wonder whether the use of a Maxwell distribution for Eqs. (16) and (23) is indeed appropriate for the very dense plasmas in which Lyman-α lines, e.g., of SiXIV show significant Stark broadening. To address this question, we estimate the Fermi energy for densities corresponding to the Inglis-Teller limit in Eq. (10) and obtain

$$E_F = \frac{\hbar^2}{2m} (3\pi^2 N)^{2/3} \leq \frac{z^3 E_H}{n^5} \quad . \tag{24}$$

This characteristic energy is therefore considerably smaller than typical thermal energies, $kT \approx z^2 E_H/4$, except for the Lyman-α lines, for which the restriction on the parameter y prevents us from calculating profiles for densities close to this limit. Extensions of our calculations based on the unified theory to these densities, should, however, account for the degeneracy of the electron gas and be based on a fully quantum-mechanical treatment of all multipole interactions. A corresponding calculation[19] for the HI Lyman-α line wings now exists but would have to be generalized to allow for inelastic collisions, quasistatic splitting and degeneracy. We also note that an approximate version[20] of the unified theory suggests corrections to the impact approximation of the order $10^{-3} z^{-1}$ for $y \leq 0.1$. An application[21] of the unified theory to ion lines gives corrections of order $10^{-4} n^4/z(z-1)^2$, both smaller than those corresponding to our choice of the maximum impact parameter. (Note that these semiclassical calculations[20,21] are based on the dipole approximation. They would have to be supplemented by an impact parameter cutoff near the excited state Bohr radius and by a quantum calculation for small L.)

Lastly, there is the question of the accuracy of the semiclassical cross section of ions in p states for partial waves $L > 20$. We therefore compare in Table II the $L = 20$ partial wave contribution to the cross section corresponding to Eq. (22), namely

$$\Delta\sigma_{n\ell} = 6\pi a_0^2 \left(\frac{2E_H}{mv^2}\right) \left(\frac{n}{z}\right)^2 (n^2 - \ell^2 - \ell - 1) \frac{1}{L} \quad , \tag{25}$$

with our distorted wave quantum-mechanical calculations. Except for the 4p values at intermediate energies, the agreement is well within the 20% overall theoretical error expected for our calculations, which are presented in the following section. (For L 40, deviations were found to be ≤5%.) For n = 2 and 3, the requirement $L_{max} \geq 20$ imposes according to Eqs. (20) and (21) an additional restriction ($y \leq 0.01$ and $y \leq 0.05$) on the parameter y to ensure L_{max} values large enough for a quasiclassical treatment of Debye shielding, finite duration of collisions and quasistatic level splittings. For the Lyman-α lines we must therefore keep the density below the Inglis-Teller limit by factors ≤50 or treat inelastic collisions in more detail. (Inelastic collisions are responsible for the rather large deviations between semiclassical partial cross sections and distorted wave results for, say, L = 10.)

V. RESULTS AND DISCUSSION

Using Eqs. (11), (17), and (23) line profiles $L(\Delta\omega)$ were calculated for electron temperatures corresponding to near maximum abudnance of the ion in question and also for half and twice these temperatures. Electron densities were varied by factors of ten over ranges determined as discussed in Sections I, III, and IV. Instead of the angular frequency displacement from line center, we used the reduced wavelength separation

$$\alpha = \frac{|\Delta\lambda|}{F_0} = \frac{|\Delta\omega|\lambda^2}{2\pi c F_0}\ 10^{-8}\ , \qquad (26)$$

with the Holtsmark normal field strength given by Eq. (2). (The factor 10^{-8} is connected with our use of Angstrom units.) This choice

ensures that the reduced profiles

$$S(\alpha) = L(\Delta\omega) \left| \frac{d\Delta\omega}{d\alpha} \right| \tag{27}$$

have a relatively weak dependence on electron density. From Eqs. (4), (26), and the Bohr (Balmer) formula for λ follow typical α-values

$$\alpha_S \approx 1.7 \times 10^{12} \frac{a_0^3}{e} \frac{n^2}{z^5} \approx 5 \times 10^{-4} \frac{n^2}{z^5} \tag{28}$$

for a given line (with principal quantum number n of the upper state) and radiating ion (of nuclear charge z).

Profiles of the lines of Aℓ XIII are included here since those reported previously[22] are in error due to the inadvertant inclusion of a section of code that adds to the ϕ matrix elements (Eq. 12) terms to account (approximately) for inelastic collisions. In conjunction with the C_n of equation 23 (equation 9 of reference 22) this is tantamount to doubling the effect of inelastic collisions.

From the calculated $S(\alpha)$ profiles, which are shown in Table IV and selected lines are plotted in Figures 1-12, we determined Stark half, quarter, and eighth intensity widths defined by

$$\frac{1}{2} S(\alpha_{max}) = S(\alpha_{1/2}), \tag{29a}$$

$$\frac{1}{4} S(\alpha_{max}) = S(\alpha_{1/4}), \tag{29b}$$

$$\frac{1}{8} S(\alpha_{max}) = S(\alpha_{1/8}), \tag{29c}$$

where α_{max} corresponds to the maximum of $S(\alpha)$. For even n-values, $S(\alpha)$ has a single central peak ($\alpha_{max} = 0$), for odd n-values a central

minimum and two symmetrically located maxima ($\alpha_{max} \neq 0$). Table III contains values of α_{max}, α_s, $\alpha_{1/2}$, $\alpha_{1/4}$, and $\alpha_{1/8}$.

Also given in Table III is a quantity α_c calculated from

$$\alpha_c \approx \frac{1}{5} \left(\frac{1}{2} a\right)^{1/2} \alpha_s \, . \tag{30}$$

where a is the parameter defined by Eq. (19) and α_s the estimated Stark broadening from Eq. (28). The factor 1/5 corresponds to the estimated ratio between Holtsmark normal field strength and effective mean field strength used in Eq. (5) and the factor $\left(\frac{1}{2} a\right)^{1/2}$ is from Eq. (13) of ref. 11, generalized by replacing the dipole matrix element for Lyman-α (3 in atomic units) with n^2.

According to ref. 11, α_c is a measure of the broadening from field fluctuations caused by electrons in the Debye shielding clouds of ions. In the case of the hydrogen Lyman-α line, a substantial theory-experiment[10] discrepancy (factor ~ 2 in half width) was removed[11] by assuming a statistically independent Gaussina broadening with 1/e width given by α_c. We therefore suggest compounding α_c with the thermal Doppler width before convolving our calculated Stark profiles with Gaussian profiles The corresponding modifications are only important near $\alpha = 0$, but do lead to substantial modifications of central profile structures, e.g., the narrow peaks of α- and γ-lines and the central dips of β- and δ-lines. For density measurements, reliance on these central structures should therefore be avoided until the physical model proposed in Ref. 11 has been verified. We note here that alternative explanations for the HI-Lyman α discrepancy[10] have been given in terms of ion-dynamical corrections[23,24] which would probably scale differently.

Our calculations were all done using microfield distributions calculated for the case of equal charges on radiating and perturbing ions, i.e., for $p = z - 1$. As can be seen from new calculations by Tighe and Hooper,[25] this results for fixed electron density in profiles that are broader than those one would obtain if most of the perturbing ions were of lower charge than the radiating ions. Also, we assumed equal ion and electron temperature and again refer the reader to Ref. 23 for a discussion of distribution functions for cases where these temperatures differ.

On the other hand, although our calculations are strictly valid only for one-electron radiating ions, they will often provide a good approximation for resonance lines of helium-like ions of the element with the next higher nuclear charge. This will be true as soon as densities are high enough for the profiles to be broader than the electrostatic splittings of np and ns, etc., levels of the unperturbed ions.

Returning to Table III, it is clear that the fractional intensity widths $\alpha_{1/n}$ for a given line rarely vary by more than a factor of two over the density and temperature range covered by these calculations. Comparing $\alpha_{1/n}$ widths for analogous lines from different elements, one finds that they scale approximately as z^{-5} for near maximum abundance temperatures and densities corresponding to similar fractions of the largest density for which calculations were made. This scaling is in accordance with the original Holtsmark theory[2] and therefore with Eq. (28). It suggests that reductions of the quasistatic broadening by ions due to ion-ion correlations and Debye screening by electrons are

largely balanced by electron impact broadening. That electron impact broadening remains sufficiently important can be inferred from Eqs. (4) and (23), which with $kT \sim z^2$ and $\underset{\sim}{R}\cdot\underset{\sim}{R} \sim z^{-2}$ indicate that the ratio of electron and ion broadening is nearly constant along the iso-electronic sequence if the electron density increases as z^6. This tends to be the case under typical experimental conditions for Stark broadening experiments[26,27,28] on hydrogenic ion lines in the Lyman series.

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Table I
Cross Sections[a] for Electron Scattering on np Levels of
Oxygen VIII and Aluminum XIII

OVIII

E/E_H	2p				4p			
	elastic[b]	inelastic	total	semicl.	elastic[b]	inelastic[c]	total	semicl.
10	1.09	0.40[d]	1.49	1.51	28.6	7.9	36.4	37.1
20	1.03	0.51	1.54	1.38	23.2	7.0	30.2	30.3
40	0.94	0.64	1.58	1.25	17.2	5.7	22.9	23.6

AℓXIII

20	0.42	0.15[d]	0.57	0.59	11.6	3.0	14.6	15.1
50	0.39	0.19	0.58	0.53	9.0	2.7	11.7	11.7
100	0.36	0.24	0.60	0.48	6.7	2.2	8.9	9.1

a) In units of πa_0^2 and multiplied by the incoming electron energy E in Rydberg Units. Only partial waves to L=20 are included.

b) For the monopole interaction contribution, the difference of np and 1s scattering amplitudes was used.

c) For the Δn=2, 3, etc., 4p cross sections, including ionization, a correction corresponding to $6E_H/\Delta E$ was added which is consistent with estimates of ionization cross sections. (Here ΔE is the energy gap between levels 4 and 6.) This correction is 2.7 for OVIII and 1.0 for AℓXIII.

d) Near-threshold values for the n=2 to 3 transitions.

Table II

L=20 partial wave contributions to the cross sections[a] for electron scattering on np levels of OVIII and AℓXIII. Semiclassical values are given in the last row.

	OVIII			AℓXIII	
E/E_H	$2p(\times 10^2)$	4p	E/E_H	$2p(\times 10^3)$	$4p(\times 10)$
10	2.02	1.13	20	7.6	4.1
20	1.83	1.24	50	6.9	4.7
40	2.15	0.99	100	7.9	3.9
	1.88	0.98		7.1	3.7

a) In units of πa_0^2 and multiplied by E/E_H and the factors following the np designations.

Table III

Calculated fractional widths $\alpha_{1/n}$ of Stark profiles for Lyman lines from 1←n transitions in one-electron ions for various temperatures and electron densities. The fractional widths are in units of 10^{-8} Ångstrom per cgs field strength, as are the positions α_m of the off-center maxima of the n=3, 5, and 7 lines and the quantities α_C, α_D, and α_S, which are defined in the text.

$10^{-6}T$ [°K]	log N_e	α_m	α_C	α_D	$\alpha_{1/2}$	$\alpha_{1/4}$	$\alpha_{1/8}$
	CARBON 1-2		α_S = 49.0				
0.5	20	0.00	3.60	10.94	0.594	1.030	1.597
1.0	20	0.00	3.00	15.47	0.440	0.760	1.172
1.0	21	0.00	3.70	3.33	0.782	1.361	2.137
2.0	20	0.00	2.50	21.88	0.325	0.562	0.865
2.0	21	0.00	3.10	4.71	0.581	1.015	1.562
2.0	22	0.00	3.70	1.02	0.992	1.757	2.800
	CARBON 1-3		α_S = 78.0				
0.5	19	19.31	4.70	42.85	33.500	50.000	70.000
0.5	20	15.62	5.70	9.23	32.250	48.000	65.000
1.0	19	20.25	4.00	60.60	35.000	55.000	75.000
1.0	20	18.94	4.80	13.06	34.500	55.000	70.000
1.0	21	15.37	5.90	2.81	32.500	48.250	65.000
2.0	19	20.62	3.40	85.70	38.000	55.000	80.000
2.0	20	20.06	4.10	18.46	36.500	55.000	75.000
2.0	21	18.75	4.90	3.98	35.250	55.000	70.000
2.0	22	14.87	6.00	0.86	32.750	48.250	65.000
	CARBON 1-4		α_S = 120.				
0.5	19	0.00	7.60	40.63	4.075	7.625	73.250
0.5	20	0.00	9.20	8.75	7.000	54.375	85.250
1.0	19	0.00	6.40	57.46	3.000	5.350	9.150
1.0	20	0.00	7.70	12.38	5.025	10.125	81.375
1.0	21	0.00	9.40	2.67	7.750	57.500	87.875
2.0	19	0.00	5.40	81.26	2.400	3.925	6.225
2.0	20	0.00	6.50	17.51	3.750	6.800	14.375
2.0	21	0.00	7.90	3.77	5.700	12.375	84.625
	CARBON 1-5		α_S = 190.				
0.5	19	26.75	11.00	39.68	90.500	143.750	198.750
0.5	20	24.75	14.00	8.55	87.000	136.250	185.625
1.0	19	27.50	9.50	56.11	93.125	147.500	205.000
1.0	20	26.50	12.00	12.09	92.250	143.750	198.750
1.0	21	24.12	14.00	2.60	82.625	130.000	176.250
2.0	19	27.87	8.00	79.35	93.125	151.875	210.000
2.0	20	27.62	9.70	17.10	94.875	150.000	207.500
2.0	21	26.50	12.00	3.68	90.500	141.250	195.000
	CARBON 1-6		α_S = 260.				
2.0	18	0.00	9.30	363.68	5.125	9.200	16.375
2.0	19	0.00	11.00	78.35	8.500	17.250	200.625
2.0	20	0.00	14.00	16.88	12.750	148.750	225.000
	CARBON 1-7		α_S = 350.				
2.0	18	38.94	12.00	360.95	189.375	307.500	430.000
2.0	19	40.06	15.00	77.77	200.625	312.500	435.000
2.0	20	39.12	18.00	16.75	195.000	305.000	420.000

$10^{-6}T$ [°K]	log N_e	α_m	α_C	α_D	$\alpha_{1/2}$	$\alpha_{1/4}$	$\alpha_{1/8}$
OXYGEN 1-2			α_S = 12.0				
1.0	21	0.00	0.90	1.62	0.147	0.256	0.397
2.0	21	0.00	0.73	2.30	0.110	0.190	0.293
2.0	22	0.00	0.88	0.49	0.190	0.335	0.527
4.0	21	0.00	0.61	3.25	0.082	0.141	0.216
4.0	22	0.00	0.74	0.70	0.143	0.249	0.385
4.0	23	0.00	0.92	0.15	0.238	0.420	0.675
OXYGEN 1-3			α_S = 18.0				
1.0	21	3.32	1.40	1.37	7.500	12.000	16.000
2.0	21	4.17	1.20	1.94	8.312	14.000	18.000
2.0	22	3.25	1.40	0.42	7.500	12.000	16.000
4.0	21	4.44	0.98	2.74	9.125	16.000	20.000
4.0	22	4.16	1.20	0.59	8.312	14.000	18.000
4.0	23	3.17	1.40	0.13	7.312	12.000	16.000
OXYGEN 1-4			α_S = 29.0				
1.0	20	0.00	1.80	6.03	0.985	1.856	19.500
1.0	21	0.00	2.20	1.30	1.620	14.000	21.500
2.0	20	0.00	1.50	8.53	0.730	1.300	2.219
2.0	21	0.00	1.90	1.84	1.165	2.331	21.000
2.0	22	0.00	2.60	0.40	1.620	13.500	21.000
4.0	20	0.00	1.30	12.06	0.550	0.960	1.520
4.0	21	0.00	1.60	2.60	0.875	1.595	3.150
4.0	22	0.00	1.90	0.56	1.230	2.512	21.000
OXYGEN 1-5			α_S = 44.0				
1.0	19	6.55	2.30	27.33	22.250	34.750	49.000
1.0	20	6.45	2.70	5.89	21.500	33.750	46.500
1.0	21	5.80	3.30	1.27	18.937	30.250	41.000
2.0	19	6.54	1.90	38.66	22.750	36.000	51.250
2.0	20	6.56	2.30	8.33	22.750	35.500	49.750
2.0	21	6.40	2.80	1.79	21.500	33.500	46.000
4.0	19	6.54	1.60	54.67	22.750	36.500	53.000
4.0	20	6.59	1.90	11.78	23.500	37.000	52.250
4.0	21	6.62	2.30	2.54	22.750	35.750	49.750
OXYGEN 1-6			α_S = 62.0				
4.0	19	0.00	2.20	53.98	1.230	2.200	3.810
4.0	20	0.00	2.70	11.63	1.940	3.800	48.000
OXYGEN 1-7			α_S = 83.0				
4.0	19	9.60	3.30	53.57	49.000	77.500	120.000
4.0	20	9.70	3.60	11.54	49.000	76.250	120.000

$10^{-6}T$ [°K]	log N_e	α_m	α_C	α_D	$\alpha_{1/2}$	$\alpha_{1/4}$	$\alpha_{1/8}$
	NEON 1-2		α_S = 3.8				
1.0	21	0.00	0.28	0.93	0.040	0.070	0.109
2.0	21	0.00	0.24	1.31	0.030	0.052	0.080
2.0	22	0.00	0.29	0.28	0.053	0.093	0.145
4.0	21	0.00	0.20	1.85	0.023	0.037	0.059
4.0	22	0.00	0.24	0.40	0.039	0.069	0.106
4.0	23	0.00	0.30	0.09	0.067	0.119	0.189
	NEON 1-3		α_S = 6.0				
1.0	20	1.19	0.38	3.62	2.712	3.925	5.275
1.0	21	0.97	0.46	0.78	2.260	3.275	4.387
2.0	20	1.39	0.32	5.12	3.125	4.537	6.100
2.0	21	1.18	0.38	1.10	2.712	3.912	5.225
2.0	22	0.97	0.46	0.24	2.260	3.275	4.387
4.0	20	1.54	0.27	7.25	3.462	5.006	6.725
4.0	21	1.39	0.32	1.56	3.125	4.537	6.075
4.0	22	1.18	0.39	0.34	2.712	3.925	5.275
4.0	23	0.95	0.47	0.07	2.220	3.212	4.312
	NEON 1-4		α_S = 9.7				
1.0	19	0.00	0.50	15.94	0.156	0.274	0.437
1.0	20	0.00	0.60	3.43	0.274	0.506	4.856
1.0	21	0.00	0.73	0.74	0.471	3.525	5.825
2.0	19	0.00	0.42	22.55	0.116	0.202	0.315
2.0	20	0.00	0.51	4.86	0.202	0.360	0.600
2.0	21	0.00	0.51	1.05	0.337	0.656	5.550
2.0	22	0.00	0.74	0.23	0.519	3.700	5.900
4.0	19	0.00	0.35	31.89	0.087	0.150	0.231
4.0	20	0.00	0.42	5.87	0.152	0.267	0.419
4.0	21	0.00	0.52	1.48	0.252	0.452	0.810
4.0	22	0.00	0.62	0.32	0.375	0.760	5.825
	NEON 1-5		α_S = 14.0				
1.0	19	2.09	0.74	15.57	6.562	11.500	16.000
1.0	20	2.04	0.90	3.35	6.500	10.750	14.500
1.0	21	1.76	1.10	0.72	5.937	9.600	12.250
2.0	19	2.10	0.62	22.02	6.937	12.500	17.500
2.0	20	2.11	0.75	4.74	6.937	11.750	16.250
2.0	21	2.02	0.91	1.02	6.625	10.750	14.250
4.0	19	2.11	0.52	31.14	7.325	13.250	18.500
4.0	20	2.14	0.63	5.71	7.325	12.500	17.750
4.0	21	2.12	0.77	1.45	7.162	11.750	16.250
	NEON 1-6		α_S = 20.0				
4.0	19	0.00	0.73	30.75	0.344	0.606	0.990
4.0	20	0.00	0.89	6.62	0.571	1.062	16.100
4.0	21	0.00	1.10	1.43	0.800	10.412	17.400
	NEON 1-7		α_S = 27.0				
4.0	19	3.19	0.98	30.52	15.000	25.750	36.125
4.0	20	3.19	1.20	6.57	15.500	26.000	35.000
4.0	21	3.06	1.40	1.42	14.750	23.750	32.375

$10^{-6}T$ [°K]	log N_e	α_m	α_C	α_D	$\alpha_{1/2}$	$\alpha_{1/4}$	$\alpha_{1/8}$
	MAGNESIUM 1-2		α_S = 1.5				
2.0	22	0.00	0.12	0.18	0.018	0.032	0.050
4.0	22	0.00	0.10	0.25	0.014	0.024	0.037
4.0	23	0.00	0.12	0.05	0.024	0.041	0.066
8.0	22	0.00	0.08	0.36	0.010	0.018	0.027
8.0	23	0.00	0.10	0.08	0.018	0.031	0.048
8.0	24	0.00	0.12	0.02	0.029	0.051	0.083
	MAGNESIUM 1-3		α_S = 2.4				
2.0	21	0.46	0.15	0.70	1.062	1.525	2.037
2.0	22	0.36	0.19	0.15	0.847	1.225	1.637
4.0	21	0.57	0.13	0.99	1.262	1.800	2.425
4.0	22	0.46	0.16	0.21	1.050	1.525	2.025
4.0	23	0.36	0.19	0.05	0.837	1.212	1.612
8.0	21	0.62	0.11	1.40	1.425	2.037	2.750
8.0	22	0.56	0.13	0.30	1.250	1.800	2.412
8.0	23	0.45	0.16	0.06	1.050	1.500	2.012
	MAGNESIUM 1-4		α_S = 3.9				
2.0	20	0.00	0.20	3.08	0.072	0.126	0.202
2.0	21	0.00	0.25	0.66	0.121	0.229	2.075
2.0	22	0.00	0.30	0.14	0.194	1.415	2.250
4.0	20	0.00	0.17	4.35	0.053	0.093	0.145
4.0	21	0.00	0.21	0.94	0.090	0.160	0.272
4.0	22	0.00	0.25	0.20	0.140	0.278	2.237
4.0	23	0.00	0.30	0.04	0.180	1.340	2.137
8.0	20	0.00	0.14	6.15	0.040	0.069	0.106
8.0	21	0.00	0.17	1.33	0.067	0.119	0.187
8.0	22	0.00	0.21	0.29	0.106	0.191	0.357
8.0	23	0.00	0.26	0.06	0.139	0.280	2.212
	MAGNESIUM 1-5		α_S = 5.8				
2.0	20	0.87	0.30	3.00	2.781	4.575	6.400
2.0	21	0.82	0.37	0.65	2.594	4.200	5.712
2.0	22	0.63	0.44	0.14	2.112	3.450	4.650
4.0	20	0.87	0.25	4.25	2.894	4.875	7.000
4.0	21	0.87	0.31	0.92	2.819	4.600	6.450
4.0	22	0.82	0.37	0.20	2.537	4.100	5.600
8.0	20	0.88	0.21	6.01	2.987	5.225	7.550
8.0	21	0.87	0.26	1.29	2.950	4.950	7.050
8.0	22	0.86	0.31	0.28	2.800	4.575	6.350
	MAGNESIUM 1-6		α_S = 8.1				
8.0	19	0.00	0.25	27.53	0.150	0.250	0.300
8.0	20	0.00	0.30	5.93	0.200	0.300	0.450
8.0	21	0.00	0.36	1.28	0.250	0.450	6.100
8.0	22	0.00	0.44	0.28	0.300	0.605	6.150
	MAGNESIUM 1-7		α_S = 11.0				
8.0	19	1.30	0.33	27.32	6.900	11.500	16.000
8.0	20	1.29	0.40	5.89	6.750	11.125	15.375
8.0	21	1.26	0.49	1.27	6.450	10.375	14.375

$10^{-6}T$ [°K]	log N_e	α_m	α_C	α_D	$\alpha_{1/2}$	$\alpha_{1/4}$	$\alpha_{1/8}$
	ALUMINUM 1-2		α_S = 1.0				
12.0	24	0.00	0.07	0.02	0.016	0.028	0.043
	ALUMINUM 1-3		α_S = 1.6				
12.0	22	0.40	0.08	0.30	0.890	1.287	1.741
12.0	23	0.32	0.10	0.06	0.740	1.080	1.452
12.0	24	0.26	0.12	0.01	0.539	0.785	1.055
	ALUMINUM 1-4		α_S = 2.6				
12.0	22	0.00	0.13	0.28	0.058	0.104	0.167
12.0	23	0.00	0.16	0.06	0.080	0.152	1.365
	ALUMINUM 1-5		α_S = 3.9				
12.0	20	0.75	0.13	5.95	2.330	4.040	5.600
12.0	21	0.68	0.16	1.28	2.180	3.740	5.212
12.0	22	0.62	0.19	0.28	1.990	3.370	4.679
	ALUMINUM 1-6		α_S = 5.4				
12.0	21	0.00	0.22	1.27	0.127	0.227	0.452
12.0	22	0.00	0.26	0.27	0.162	0.320	3.990
	ALUMINUM 1-7		α_S = 7.3				
12.0	20	1.04	0.24	5.83	4.675	7.900	11.000
12.0	21	0.98	0.30	1.26	4.450	7.450	10.312
12.0	22	0.87	0.36	0.27	3.931	6.550	9.050

$10^{-6}T$ [°K]	log N_e	α_m	α_C	α_D	$\alpha_{1/2}$	$\alpha_{1/4}$	$\alpha_{1/8}$
	SILICON 1-2		α_S = 0.7				
5.0	23	0.00	0.05	0.04	0.009	0.015	0.024
10.0	23	0.00	0.04	0.06	0.007	0.011	0.017
10.0	24	0.00	0.05	0.01	0.011	0.019	0.031
20.0	23	0.00	0.04	0.08	0.005	0.009	0.013
20.0	24	0.00	0.04	0.02	0.009	0.014	0.023
	SILICON 1-3		α_S = 1.1				
5.0	22	0.22	0.07	0.16	0.509	0.732	0.979
5.0	23	0.17	0.08	0.04	0.401	0.575	0.762
10.0	22	0.26	0.06	0.23	0.592	0.855	1.155
10.0	23	0.22	0.07	0.05	0.506	0.727	0.967
20.0	22	0.29	0.05	0.33	0.669	0.967	1.300
20.0	23	0.26	0.06	0.07	0.587	0.850	1.145
	SILICON 1-4		α_S = 1.8				
5.0	21	0.00	0.09	0.72	0.034	0.060	0.096
5.0	22	0.00	0.11	0.15	0.054	0.104	0.955
5.0	23	0.00	0.13	0.03	0.075	0.580	0.980
10.0	21	0.00	0.08	1.01	0.026	0.044	0.069
10.0	22	0.00	0.09	0.22	0.041	0.073	0.122
10.0	23	0.00	0.11	0.05	0.058	0.111	0.985
20.0	21	0.00	0.07	1.43	0.020	0.034	0.052
20.0	22	0.00	0.08	0.31	0.032	0.055	0.087
20.0	23	0.00	0.09	0.07	0.045	0.081	0.137
	SILICON 1-5		α_S = 2.7				
5.0	20	0.44	0.11	3.25	1.485	2.510	3.530
5.0	21	0.41	0.14	0.70	1.345	2.265	3.150
5.0	22	0.36	0.16	0.15	1.167	1.965	2.710
10.0	20	0.49	0.09	4.60	1.595	2.735	3.840
10.0	21	0.45	0.11	0.99	1.490	2.510	3.520
10.0	22	0.41	0.14	0.21	1.345	2.250	3.120
20.0	20	0.54	0.08	6.50	1.680	2.912	4.080
20.0	21	0.49	0.09	1.40	1.595	2.735	3.840
20.0	22	0.45	0.12	0.30	1.495	2.505	3.510
	SILICON 1-6		α_S = 3.8				
20.0	20	0.00	0.11	6.42	0.044	0.076	0.117
20.0	21	0.00	0.13	1.38	0.069	0.122	0.197
	SILICON 1-7		α_S = 5.0				
20.0	20	0.75	0.15	5.37	3.350	5.750	7.937
20.0	21	0.70	0.18	1.37	3.225	5.425	7.525

Table IV

Stark profiles of the Lyman lines for $1 \leftarrow n$ transitions of one-electron ions for various temperatures and densities.

The profiles are tabulated as functions of

$$\alpha = \frac{|\Delta\lambda|}{F_o} \quad \text{(Ångstrom per cgs field strength).}$$

Also tabulated are the parameters α_S, α_C, α_D and Y_S, which are defined in the text.

The theoretical error estimate of 20% must be increased (particularly for the wings) for those profiles having $y_S \geq 0.1$ (0.01, 0.05 for Lyman α and Lyman-β respectively).

NA = 1 NB = 2
T = 5.00E 05 Z = 6.0E 00

ALPHA-S	4.9E-07
NE	1.0E 20
A	0.274
ALPHA-C	3.6E-08
ALPHA-D	1.1E-07
Y-S	3.4E-05

ALPHA	S(ALPHA)
0.00E 00	3.64E 07
1.00E-09	3.54E 07
3.00E-09	2.89E 07
5.00E-09	2.12E 07
7.00E-09	1.51E 07
1.00E-08	9.45E 06
1.30E-08	6.32E 06
1.60E-08	4.50E 06
2.00E-08	3.10E 06
2.50E-08	2.15E 06
3.00E-08	1.63E 06
3.50E-08	1.32E 06
4.00E-08	1.13E 06
5.00E-08	9.31E 05
6.00E-08	8.53E 05
8.00E-08	8.12E 05
1.00E-07	7.93E 05
1.50E-07	6.66E 05
2.00E-07	4.87E 05
2.50E-07	3.01E 05
3.00E-07	2.00E 05
4.00E-07	9.62E 04
5.00E-07	5.11E 04
7.00E-07	1.93E 04

NA = 1 NB = 2
T = 1.00E 06 Z = 6.0E 00

ALPHA-S	4.9E-07	
NE	1.0E 20	1.0E 21
A	0.193	0.284
ALPHA-C	3.0E-08	3.7E-08
ALPHA-D	1.5E-07	3.3E-08
Y-S	1.7E-05	2.1E-04

ALPHA	--- S(ALPHA) ---	
0.00E 00	4.88E 07	2.78E 07
1.00E-09	4.63E 07	2.73E 07
3.00E-09	3.31E 07	2.42E 07
5.00E-09	2.11E 07	1.96E 07
7.00E-09	1.37E 07	1.53E 07
1.00E-08	7.89E 06	1.05E 07
1.30E-08	5.04E 06	7.42E 06
1.60E-08	3.50E 06	5.46E 06
2.00E-08	2.35E 06	3.85E 06
2.50E-08	1.60E 06	2.70E 06
3.00E-08	1.19E 06	2.04E 06
3.50E-08	9.55E 05	1.64E 06
4.00E-08	8.11E 05	1.39E 06
5.00E-08	6.67E 05	1.11E 06
6.00E-08	6.18E 05	9.77E 05
8.00E-08	6.18E 05	8.78E 05
1.00E-07	6.46E 05	8.27E 05
1.50E-07	6.36E 05	6.74E 05
2.00E-07	5.17E 05	4.88E 05
2.50E-07	3.42E 05	3.01E 05
3.00E-07	2.40E 05	2.00E 05
4.00E-07	1.19E 05	9.68E 04
5.00E-07	6.32E 04	5.19E 04
7.00E-07	2.40E 04	2.00E 04

NA = 1 NB = 2
T = 2.00E 05 Z = 6.0E 00

ALPHA-S	4.9E-07		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.137	0.201	0.295
ALPHA-C	2.5E-08	3.1E-08	3.7E-08
ALPHA-D	2.2E-07	4.7E-08	1.0E-08
Y-S	8.5E-06	1.1E-04	1.5E-03

ALPHA	S(ALPHA)		
0.00E 00	6.55E 07	3.68E 07	2.20E 07
1.00E-09	5.98E 07	3.57E 07	2.18E 07
3.00E-09	3.53E 07	2.90E 07	2.02E 07
5.00E-09	1.94E 07	2.11E 07	1.75E 07
7.00E-09	1.16E 07	1.50E 07	1.47E 07
1.00E-08	6.30E 06	9.35E 06	1.09E 07
1.30E-08	3.91E 06	6.22E 06	8.16E 06
1.60E-08	2.66E 06	4.40E 06	6.23E 06
2.00E-08	1.77E 06	3.01E 06	4.53E 06
2.50E-08	1.19E 06	2.06E 06	3.24E 06
3.00E-08	8.79E 05	1.53E 06	2.47E 06
3.50E-08	7.01E 05	1.21E 06	1.98E 06
4.00E-08	5.94E 05	1.02E 06	1.66E 06
5.00E-08	4.90E 05	8.05E 05	1.30E 06
6.00E-08	4.62E 05	7.17E 05	1.11E 06
8.00E-08	4.86E 05	6.74E 05	9.48E 05
1.00E-07	5.40E 05	6.78E 05	8.65E 05
1.50E-07	5.98E 05	6.46E 05	6.82E 05
2.00E-07	5.23E 05	5.20E 05	4.88E 05
2.50E-07	3.64E 05	3.43E 05	3.01E 05
3.00E-07	2.77E 05	2.36E 05	2.00E 05
4.00E-07	1.41E 05	1.18E 05	9.79E 04
5.00E-07	7.30E 04	6.38E 04	5.29E 04
7.00E-07	2.78E 04	2.47E 04	2.06E 04

NA = 1 NB = 3
T = 5.00E 05 Z = 6.0E 00

ALPHA-S	7.8E-07	
NE	1.0E 19	1.0E 20
A	0.186	0.274
ALPHA-C	4.7E-08	5.7E-08
ALPHA-D	4.3E-07	9.2E-08
Y-S	2.2E-05	3.2E-04

ALPHA	--- S(ALPHA) ---	
0.00E 00	1.35E 05	2.83E 05
3.00E-09	1.37E 05	2.85E 05
5.00E-09	1.41E 05	2.89E 05
7.00E-09	1.45E 05	2.95E 05
1.00E-08	1.55E 05	3.07E 05
1.50E-08	1.76E 05	3.34E 05
2.00E-08	2.04E 05	3.69E 05
2.50E-08	2.37E 05	4.11E 05
3.00E-08	2.75E 05	4.59E 05
3.50E-08	3.18E 05	5.11E 05
4.00E-08	3.66E 05	5.67E 05
5.00E-08	4.69E 05	6.87E 05
6.00E-08	5.81E 05	8.09E 05
7.00E-08	6.94E 05	9.27E 05
8.00E-08	8.03E 05	1.03E 06
1.00E-07	9.95E 05	1.20E 06
1.50E-07	1.25E 06	1.34E 06
2.00E-07	1.35E 06	1.28E 06
3.00E-07	8.01E 05	7.55E 05
4.00E-07	5.64E 05	4.99E 05
5.00E-07	3.36E 05	2.97E 05
7.00E-07	1.56E 05	1.32E 05
1.00E-06	6.16E 04	5.19E 04

NA = 1 N3 = 3
T = 1.00E 06 Z = 6.0E 00

ALPHA-S	7.8E-07		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.132	0.195	0.284
ALPHA-C	4.0E-08	4.8E-08	5.9E-08
ALPHA-D	6.1E-07	1.3E-07	2.8E-08
Y-S	1.1E-05	1.6E-04	2.6E-03

ALPHA	S(ALPHA)		
0.00E 00	8.40E 04	1.71E 05	3.32E 05
3.00E-09	8.56E 04	1.73E 05	3.34E 05
5.00E-09	8.83E 04	1.76E 05	3.37E 05
7.00E-09	9.20E 04	1.81E 05	3.42E 05
1.00E-08	9.93E 04	1.90E 05	3.53E 05
1.50E-08	1.15E 05	2.10E 05	3.78E 05
2.00E-08	1.36E 05	2.37E 05	4.11E 05
2.50E-08	1.61E 05	2.69E 05	4.50E 05
3.00E-08	1.91E 05	3.06E 05	4.95E 05
3.50E-08	2.25E 05	3.47E 05	5.43E 05
4.00E-08	2.62E 05	3.91E 05	5.95E 05
5.00E-08	3.48E 05	4.89E 05	7.05E 05
6.00E-08	4.43E 05	5.94E 05	8.18E 05
7.00E-08	5.44E 05	7.01E 05	9.27E 05
8.00E-08	5.46E 05	8.04E 05	1.03E 06
1.00E-07	8.38E 05	9.84E 05	1.18E 06
1.50E-07	1.14E 06	1.23E 06	1.32E 06
2.00E-07	1.35E 06	1.30E 06	1.24E 06
3.00E-07	8.32E 05	7.98E 05	7.52E 05
4.00E-07	6.04E 05	5.57E 05	4.94E 05
5.00E-07	3.64E 05	3.38E 05	2.99E 05
7.00E-07	1.78E 05	1.56E 05	1.34E 05
1.00E-06	6.93E 04	6.25E 04	5.25E 04

NA = 1 NB = 3
T = 2.00E 06 Z = 6.0E 00

ALPHA-S	7.8E-07			
NE	1.0E 19	1.0E 20	1.0E 21	1.0E 22
A	0.093	0.137	0.201	0.295
ALPHA-C	3.4E-08	4.1E-08	4.9E-08	6.0E-08
ALPHA-D	8.6E-07	1.8E-07	4.0E-08	8.6E-09
Y-S	5.5E-06	8.0E-05	1.3E-03	2.6E-02

ALPHA	S(ALPHA)			
0.00E 00	5.48E 04	1.08E 05	2.06E 05	3.65E 05
3.00E-09	5.62E 04	1.10E 05	2.08E 05	3.67E 05
5.00E-09	5.84E 04	1.12E 05	2.11E 05	3.70E 05
7.00E-09	6.15E 04	1.16E 05	2.15E 05	3.75E 05
1.00E-08	6.72E 04	1.23E 05	2.23E 05	3.85E 05
1.50E-08	7.96E 04	1.39E 05	2.43E 05	4.10E 05
2.00E-08	9.59E 04	1.59E 05	2.69E 05	4.42E 05
2.50E-08	1.16E 05	1.84E 05	3.00E 05	4.80E 05
3.00E-08	1.40E 05	2.13E 05	3.35E 05	5.23E 05
3.50E-08	1.69E 05	2.46E 05	3.74E 05	5.70E 05
4.00E-08	2.01E 05	2.83E 05	4.16E 05	6.21E 05
5.00E-08	2.74E 05	3.65E 05	5.09E 05	7.27E 05
6.00E-08	3.57E 05	4.56E 05	6.07E 05	8.36E 05
7.00E-08	4.48E 05	5.53E 05	7.07E 05	9.41E 05
8.00E-08	5.43E 05	6.50E 05	8.04E 05	1.04E 06
1.00E-07	7.30E 05	8.34E 05	9.75E 05	1.19E 06
1.50E-07	1.06E 06	1.13E 06	1.21E 06	1.31E 06
2.00E-07	1.32E 06	1.31E 06	1.26E 06	1.22E 06
3.00E-07	8.53E 05	8.28E 05	7.94E 05	7.47E 05
4.00E-07	6.32E 05	6.00E 05	5.50E 05	4.83E 05
5.00E-07	3.82E 05	3.67E 05	3.39E 05	2.97E 05
7.00E-07	2.03E 05	1.76E 05	1.57E 05	1.32E 05
1.00E-06	7.40E 04	7.04E 04	6.31E 04	5.14E 04

NA = 1 NB = 4
T = 5.00E 05 Z = 6.0E 00

ALPHA-S	1.2E-06	
NE	1.0E 19	1.0E 20
A	0.186	0.274
ALPHA-C	7.6E-08	9.2E-08
ALPHA-D	4.1E-07	8.8E-08
Y-S	1.3E-04	2.5E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	2.25E 06	1.51E 06
1.00E-09	2.12E 06	1.47E 06
3.00E-08	1.44E 06	1.24E 06
4.00E-08	1.14E 06	1.10E 06
5.00E-09	9.09E 05	9.68E 05
6.00E-08	7.40E 05	8.51E 05
7.00E-08	6.19E 05	7.55E 05
8.00E-08	5.32E 05	6.77E 05
9.00E-08	4.69E 05	6.15E 05
1.00E-07	4.24E 05	5.68E 05
1.50E-07	3.41E 05	4.58E 05
2.00E-07	3.50E 05	4.44E 05
2.50E-07	3.75E 05	4.52E 05
3.00E-07	3.96E 05	4.57E 05
4.00E-07	4.21E 05	4.47E 05
5.00E-07	4.04E 05	4.01E 05
7.00E-07	2.98E 05	2.72E 05
1.00E-06	1.47E 05	1.33E 05
2.00E-06	2.65E 04	2.33E 04
3.00E-06	8.99E 03	7.78E 03
5.00E-06	2.45E 03	1.94E 03

NA = 1 NB = 4
T = 1.00E 06 Z = 6.0E 00

ALPHA-S	1.2E-06		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.132	0.193	0.284
ALPHA-C	6.4E-08	7.7E-08	9.4E-08
ALPHA-D	5.7E-07	1.2E-07	2.7E-08
Y-S	7.0E-05	1.2E-03	2.0E-02

ALPHA	----------	S(ALPHA)	--------
0.00E 00	2.94E 06	1.88E 06	1.42E 06
1.00E-08	2.64E 06	1.80E 06	1.39E 06
3.00E-09	1.47E 06	1.37E 06	1.20E 06
4.00E-09	1.07E 06	1.14E 06	1.08E 06
5.00E-08	8.03E 05	9.43E 05	9.60E 05
6.00E-08	6.27E 05	7.90E 05	8.55E 05
7.00E-08	5.09E 05	6.73E 05	7.66E 05
8.00E-08	4.29E 05	5.85E 05	6.92E 05
9.00E-08	3.74E 05	5.19E 05	6.32E 05
1.00E-07	3.36E 05	4.70E 05	5.85E 05
1.50E-07	2.73E 05	3.67E 05	4.72E 05
2.00E-07	2.91E 05	3.62E 05	4.55E 05
2.50E-07	3.23E 05	3.80E 05	4.60E 05
3.00E-07	3.51E 05	3.97E 05	4.62E 05
4.00E-07	3.95E 05	4.18E 05	4.48E 05
5.00E-07	3.97E 05	4.00E 05	4.00E 05
7.00E-07	3.15E 05	2.93E 05	2.69E 05
1.00E-06	1.59E 05	1.47E 05	1.31E 05
2.00E-06	2.90E 04	2.69E 04	2.25E 04
3.00E-06	9.55E 03	9.16E 03	7.25E 03
5.00E-06	2.52E 03	2.47E 03	1.67E 03

NA = 1 NB = 4
T = 2.00E 06 Z = 6.0E 00

ALPHA-S	1.2E-06		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.093	0.137	0.201
ALPHA-C	5.4E-08	6.5E-08	7.9E-08
ALPHA-D	8.1E-07	1.8E-07	3.8E-08
Y-S	3.0E-05	6.0E-04	1.0E-02

ALPHA	S(ALPHA)		
0.00E 00	3.87E 06	2.40E 06	1.70E 06
1.00E-08	3.22E 06	2.23E 06	1.64E 06
3.00E-08	1.39E 06	1.45E 06	1.31E 06
4.00E-08	9.38E 05	1.12E 06	1.12E 06
5.00E-08	6.73E 05	8.75E 05	9.49E 05
6.00E-08	5.10E 05	7.01E 05	8.10E 05
7.00E-08	4.07E 05	5.78E 05	6.99E 05
8.00E-08	3.39E 05	4.90E 05	6.13E 05
9.00E-08	2.94E 05	4.27E 05	5.47E 05
1.00E-07	2.64E 05	3.83E 05	4.97E 05
1.50E-07	2.22E 05	2.96E 05	3.84E 05
2.00E-07	2.48E 05	3.02E 05	3.72E 05
2.50E-07	2.86E 05	3.28E 05	3.86E 05
3.00E-07	3.19E 05	3.53E 05	4.00E 05
4.00E-07	3.72E 05	3.94E 05	4.18E 05
5.00E-07	3.87E 05	3.94E 05	3.98E 05
7.00E-07	3.31E 05	3.09E 05	2.90E 05
1.00E-06	1.69E 05	1.59E 05	1.47E 05
2.00E-06	3.08E 04	2.95E 04	2.66E 04
3.00E-06	9.61E 03	9.82E 03	8.93E 03
5.00E-06	2.39E 03	2.60E 03	2.32E 03

NA = 1 NB = 5
T = 5.00E 05 Z = 6.0E 00

ALPHA-S	1.9E-06	
NE	1.0E 19	1.0E 20
A	0.186	0.274
ALPHA-C	1.1E-07	1.4E-07
ALPHA-D	4.0E-07	8.5E-08
Y-S	6.5E-04	1.3E-02

ALPHA	--- S(ALPHA) ---	
0.00E 00	1.90E 05	2.76E 05
3.00E-08	2.02E 05	2.86E 05
5.00E-08	2.21E 05	3.02E 05
7.00E-08	2.46E 05	3.22E 05
1.00E-07	2.92E 05	3.58E 05
1.50E-07	3.66E 05	4.13E 05
2.00E-07	4.22E 05	4.47E 05
2.50E-07	4.53E 05	4.58E 05
3.00E-07	4.48E 05	4.46E 05
3.50E-07	4.18E 05	4.20E 05
4.00E-07	3.87E 05	3.92E 05
5.00E-07	3.37E 05	3.44E 05
6.00E-07	2.99E 05	3.04E 05
7.00E-07	2.69E 05	2.72E 05
8.00E-07	2.52E 05	2.46E 05
1.00E-06	2.01E 05	1.92E 05
1.50E-06	1.03E 05	9.29E 04
2.00E-06	5.50E 04	4.81E 04
3.00E-06	1.98E 04	1.67E 04
4.00E-06	9.00E 03	7.62E 03
5.00E-06	4.96E 03	4.07E 03
7.00E-06	2.08E 03	1.56E 03
1.00E-05	9.63E 02	6.31E 02

NA = 1 NB = 5
T = 1.00E 06 Z = 6.0E 00

ALPHA-S	1.9E-06		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.132	0.193	0.284
ALPHA-C	9.5E-08	1.2E-07	1.4E-07
ALPHA-D	5.6E-07	1.2E-07	2.6E-08
Y-S	3.4E-04	6.8E-03	1.4E-01

ALPHA	S(ALPHA)		
0.00E 00	1.37E 05	2.04E 05	2.76E 05
3.00E-08	1.49E 05	2.15E 05	2.88E 05
5.00E-08	1.69E 05	2.32E 05	3.07E 05
7.00E-08	1.96E 05	2.55E 05	3.32E 05
1.00E-07	2.44E 05	2.96E 05	3.75E 05
1.50E-07	3.30E 05	3.64E 05	4.37E 05
2.00E-07	4.00E 05	4.16E 05	4.73E 05
2.50E-07	4.48E 05	4.43E 05	4.82E 05
3.00E-07	4.49E 05	4.38E 05	4.65E 05
3.50E-07	4.16E 05	4.12E 05	4.34E 05
4.00E-07	3.85E 05	3.83E 05	4.03E 05
5.00E-07	3.35E 05	3.35E 05	3.51E 05
6.00E-07	2.96E 05	2.98E 05	3.09E 05
7.00E-07	2.67E 05	2.69E 05	2.74E 05
8.00E-07	2.56E 05	2.50E 05	2.48E 05
1.00E-06	2.05E 05	2.00E 05	1.90E 05
1.50E-06	1.09E 05	1.02E 05	8.82E 04
2.00E-06	5.99E 04	5.48E 04	4.44E 04
3.00E-06	2.15E 04	1.96E 04	1.46E 04
4.00E-06	9.64E 03	8.86E 03	6.45E 03
5.00E-06	5.18E 03	4.82E 03	3.25E 03
7.00E-06	2.23E 03	1.99E 03	1.25E 03
1.00E-05	1.12E 03	9.44E 02	5.45E 02

NA = 1 NB = 5
T = 2.00E 06 , Z = 6.0E 00

ALPHA-S	1.9E-06		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.093	0.137	0.201
ALPHA-C	8.0E-08	9.7E-08	1.2E-07
ALPHA-D	7.9E-07	1.7E-07	3.7E-08
Y-S	1.5E-04	3.0E-03	6.0E-01

ALPHA	----------	S(ALPHA)	--------
0.00E 00	9.98E 04	1.52E 05	2.05E 05
3.00E-09	1.12E 05	1.63E 05	2.16E 05
5.00E-08	1.31E 05	1.81E 05	2.35E 05
7.00E-08	1.58E 05	2.05E 05	2.60E 05
1.00E-07	2.09E 05	2.49E 05	3.03E 05
1.50E-07	3.02E 05	3.28E 05	3.75E 05
2.00E-07	3.82E 05	3.93E 05	4.27E 05
2.50E-07	4.47E 05	4.36E 05	4.53E 05
3.00E-07	4.53E 05	4.38E 05	4.47E 05
3.50E-07	4.16E 05	4.09E 05	4.18E 05
4.00E-07	3.86E 05	3.81E 05	3.88E 05
5.00E-07	3.36E 05	3.33E 05	3.38E 05
6.00E-07	2.94E 05	2.94E 05	3.00E 05
7.00E-07	2.65E 05	2.66E 05	2.70E 05
8.00E-07	2.60E 05	2.53E 05	2.51E 05
1.00E-06	2.06E 05	2.05E 05	2.00E 05
1.50E-06	1.15E 05	1.09E 05	1.00E 05
2.00E-06	6.39E 04	6.00E 04	5.27E 04
3.00E-06	2.29E 04	2.15E 04	1.83E 04
4.00E-06	1.01E 04	9.62E 03	8.14E 03
5.00E-06	5.24E 03	5.17E 03	4.25E 03
7.00E-06	2.36E 03	2.21E 03	1.83E 03
1.00E-05	1.26E 03	1.13E 03	9.83E 02

NA = 1 NB = 6
T = 2.00E 06 Z = 6.0E 00

ALPHA-S	2.6E-06		
NE	1.0E 18	1.0E 19	1.0E 20
A	0.064	0.093	0.137
ALPHA-C	9.3E-08	1.1E-07	1.4E-07
ALPHA-D	3.6E-06	7.8E-07	1.7E-07
Y-S	3.0E-05	6.0E-04	1.3E-02

ALPHA	----------	S(ALPHA)	--------
0.00E 00	1.12E 06	7.25E 05	5.52E 05
3.00E-08	8.27E 05	6.38E 05	5.17E 05
5.00E-08	5.69E 05	5.29E 05	4.66E 05
7.00E-08	3.93E 05	4.25E 05	4.08E 05
1.00E-07	2.48E 05	3.08E 05	3.30E 05
1.50E-07	1.51E 05	2.04E 05	2.42E 05
2.00E-07	1.22E 05	1.63E 05	1.99E 05
2.50E-07	1.18E 05	1.49E 05	1.81E 05
3.00E-07	1.25E 05	1.49E 05	1.77E 05
3.50E-07	1.35E 05	1.55E 05	1.80E 05
4.00E-07	1.48E 05	1.64E 05	1.85E 05
5.00E-07	1.73E 05	1.84E 05	2.00E 05
6.00E-07	2.05E 05	2.07E 05	2.14E 05
7.00E-07	2.06E 05	2.09E 05	2.14E 05
8.00E-07	1.96E 05	1.99E 05	2.04E 05
1.00E-06	1.86E 05	1.85E 05	1.85E 05
1.50E-06	1.42E 05	1.39E 05	1.36E 05
2.00E-06	9.26E 04	9.02E 04	8.67E 04
3.00E-06	4.13E 04	4.01E 04	3.74E 04
4.00E-06	2.02E 04	1.96E 04	1.82E 04
5.00E-06	1.06E 04	1.06E 04	9.94E 03
7.00E-06	3.96E 03	4.17E 03	3.94E 03
1.00E-05	1.34E 03	1.48E 03	1.38E 03

NA = 1 NB = 7
T = 2.00E 06 Z = 6.0E 00

ALPHA-S	3.5E-06		
NE	1.0E 18	1.0E 19	1.0E 20
A	0.064	0.093	0.137
ALPHA-C	1.2E-07	1.5E-07	1.8E-07
ALPHA-D	3.6E-06	7.8E-07	1.7E-07
Y-S	1.0E-04	2.0E-03	4.5E-02

ALPHA	S(ALPHA)		
0.00E 00	6.55E 04	9.21E 04	1.15E 05
3.00E-08	6.79E 04	9.39E 04	1.16E 05
5.00E-08	7.20E 04	9.72E 04	1.19E 05
7.00E-08	7.80E 04	1.02E 05	1.23E 05
1.00E-07	8.59E 04	1.11E 05	1.32E 05
1.50E-07	1.16E 05	1.31E 05	1.49E 05
2.00E-07	1.45E 05	1.54E 05	1.67E 05
2.50E-07	1.73E 05	1.75E 05	1.85E 05
3.00E-07	1.98E 05	1.93E 05	1.98E 05
3.50E-07	2.17E 05	2.05E 05	2.07E 05
4.00E-07	2.21E 05	2.09E 05	2.09E 05
5.00E-07	2.07E 05	2.00E 05	2.01E 05
6.00E-07	1.91E 05	1.87E 05	1.89E 05
7.00E-07	1.77E 05	1.75E 05	1.78E 05
8.00E-07	1.65E 05	1.65E 05	1.69E 05
1.00E-06	1.53E 05	1.54E 05	1.58E 05
1.50E-06	1.29E 05	1.28E 05	1.28E 05
2.00E-06	1.05E 05	1.04E 05	1.02E 05
3.00E-06	5.80E 04	5.64E 04	5.34E 04
4.00E-06	3.24E 04	3.13E 04	2.89E 04
5.00E-06	1.84E 04	1.80E 04	1.64E 04
7.00E-06	7.37E 03	7.31E 03	6.61E 03
1.00E-05	2.64E 03	2.73E 03	2.41E 03

NA = 1 NB = 2
T = 1.00E 06 Z = 8.0E 00

ALPHA-S	1.2E-07
NE	1.0E 21
A	0.284
ALPHA-C	9.0E-09
ALPHA-D	1.6E-08
Y-S	1.0E-04

ALPHA	S(ALPHA)
0.00E 00	1.47E 08
5.00E-11	1.47E 08
1.00E-10	1.46E 08
2.00E-10	1.44E 08
3.00E-10	1.41E 08
4.00E-10	1.36E 08
5.00E-10	1.31E 08
6.00E-10	1.26E 08
8.00E-10	1.13E 08
1.00E-09	1.00E 08
1.40E-09	7.67E 07
1.80E-09	5.86E 07
2.00E-09	5.15E 07
2.20E-09	4.54E 07
2.60E-09	3.58E 07
3.00E-09	2.88E 07
3.50E-09	2.26E 07
4.00E-09	1.81E 07
4.50E-09	1.50E 07
5.00E-09	1.26E 07
6.00E-09	9.40E 06
7.00E-09	7.46E 06
8.00E-09	6.22E 06
9.00E-09	5.41E 06
1.00E-08	4.85E 06
2.00E-08	3.65E 06
3.00E-08	3.19E 06
4.00E-08	2.81E 06
6.00E-08	1.19E 06
8.00E-08	5.86E 05
1.00E-07	3.16E 05
2.00E-07	3.92E 04

NA = 1 NB = 2
T = 2.00E 06 Z = 8.0E 00

ALPHA-S	1.2E-07	
NE	1.0E 21	1.0E 22
A	0.201	0.295
ALPHA-C	7.3E-09	8.8E-09
ALPHA-D	2.3E-08	4.9E-09
Y-S	5.0E-05	6.2E-04

ALPHA	--- S(ALPHA) ---	
0.00E 00	1.95E 08	1.14E 08
5.00E-11	1.95E 08	1.14E 08
1.00E-10	1.94E 08	1.13E 08
2.00E-10	1.89E 08	1.13E 08
3.00E-10	1.81E 08	1.11E 08
4.00E-10	1.72E 08	1.09E 08
5.00E-10	1.61E 08	1.06E 08
6.00E-10	1.50E 08	1.03E 08
8.00E-10	1.27E 08	9.66E 07
1.00E-09	1.06E 08	8.91E 07
1.40E-09	7.40E 07	7.38E 07
1.80E-09	5.27E 07	6.01E 07
2.00E-09	4.51E 07	5.42E 07
2.20E-09	3.89E 07	4.89E 07
2.60E-09	2.96E 07	4.00E 07
3.00E-09	2.33E 07	3.31E 07
3.50E-09	1.78E 07	2.66E 07
4.00E-09	1.41E 07	2.18E 07
4.50E-09	1.14E 07	1.82E 07
5.00E-09	9.49E 06	1.54E 07
6.00E-09	6.56E 06	1.16E 07
7.00E-09	5.43E 06	9.24E 06
8.00E-09	4.46E 06	7.66E 06
9.00E-09	3.83E 06	6.60E 06
1.00E-08	3.40E 06	5.85E 06
2.00E-08	2.70E 06	3.90E 06
3.00E-08	2.77E 06	3.26E 06
4.00E-08	2.85E 06	2.77E 06
6.00E-08	1.44E 06	1.18E 06
8.00E-08	7.53E 05	5.84E 05
1.00E-07	4.21E 05	3.17E 05
2.00E-07	5.71E 04	4.00E 04

NA = 1 NB = 2
T = 4.00E 06 Z = 8.0E 00

ALPHA-S	1.2E-07		
NE	1.0E 21	1.0E 22	1.0E 23
A	0.142	0.208	0.306
ALPHA-C	6.1E-09	7.4E-09	9.2E-09
ALPHA-D	3.2E-08	7.0E-09	1.5E-09
Y-S	2.5E-05	3.1E-04	5.0E-03

ALPHA	S(ALPHA)		
0.00E 00	2.61E 08	1.50E 08	9.25E 07
5.00E-11	2.60E 08	1.49E 08	9.25E 07
1.00E-10	2.57E 08	1.49E 08	9.24E 07
2.00E-10	2.46E 08	1.47E 08	9.19E 07
3.00E-10	2.30E 08	1.43E 08	9.11E 07
4.00E-10	2.10E 08	1.39E 08	8.99E 07
5.00E-10	1.90E 08	1.33E 08	8.85E 07
6.00E-10	1.69E 08	1.27E 08	8.69E 07
8.00E-10	1.33E 08	1.14E 08	8.29E 07
1.00E-09	1.04E 08	1.00E 08	7.84E 07
1.40E-09	6.61E 07	7.64E 07	6.84E 07
1.80E-09	4.45E 07	5.80E 07	5.85E 07
2.00E-09	3.73E 07	5.08E 07	5.39E 07
2.20E-09	3.17E 07	4.47E 07	4.97E 07
2.60E-09	2.36E 07	3.51E 07	4.21E 07
3.00E-09	1.82E 07	2.81E 07	3.58E 07
3.50E-09	1.37E 07	2.19E 07	2.95E 07
4.00E-09	1.07E 07	1.75E 07	2.47E 07
4.50E-09	8.62E 06	1.43E 07	2.09E 07
5.00E-09	7.12E 06	1.20E 07	1.79E 07
6.00E-09	5.15E 06	8.82E 06	1.37E 07
7.00E-09	3.98E 06	6.88E 06	1.09E 07
8.00E-09	3.24E 06	5.62E 06	9.06E 06
9.00E-09	2.76E 06	4.77E 06	7.77E 06
1.00E-08	2.43E 06	4.19E 06	6.84E 06
2.00E-08	2.06E 06	2.91E 06	4.15E 06
3.00E-08	2.41E 06	2.84E 06	3.32E 06
4.00E-08	2.71E 06	2.86E 06	2.72E 06
6.00E-08	1.59E 06	1.43E 06	1.17E 06
8.00E-08	8.78E 05	7.53E 05	5.81E 05
1.00E-07	5.12E 05	4.22E 05	3.18E 05
2.00E-07	6.82E 04	5.90E 04	3.99E 04

NA = 1 NB = 3
T = 1.00E 06 Z = 8.0E 00

ALPHA-S	1.8E-07
NE	1.0E 21
A	0.784
ALPHA-C	1.4E-08
ALPHA-D	1.4E-08
Y-S	1.0E-03

ALPHA	S(ALPHA)
0.00E 00	1.33E 06
4.00E-10	1.34E 06
7.00E-10	1.34E 06
1.00E-09	1.35E 06
1.50E-09	1.38E 06
2.00E-09	1.42E 06
2.50E-09	1.46E 06
3.00E-09	1.51E 06
3.50E-09	1.57E 06
4.00E-09	1.64E 06
4.50E-09	1.71E 06
5.00E-09	1.79E 06
5.50E-09	1.87E 06
6.00E-09	1.96E 06
6.50E-09	2.05E 06
7.00E-09	2.15E 06
8.00E-09	2.36E 06
9.00E-09	2.57E 06
1.00E-08	2.80E 06
1.20E-08	3.27E 06
1.40E-08	3.73E 06
1.70E-08	4.39E 06
2.00E-08	4.95E 06
2.25E-08	5.32E 06
2.50E-09	5.59E 06
2.75E-08	5.77E 06
3.00E-08	5.87E 06
3.50E-08	5.90E 06
4.00E-08	5.83E 06
5.00E-08	5.12E 06
7.50E-08	2.91E 06
1.00E-07	1.79E 06
2.00E-07	3.09E 05
3.00E-07	9.65E 04

NA = 1 NB = 3
T = 2.00E 06 Z = 8.0E 00

ALPHA-S	1.8E-07	
NE	1.0E 21	1.0E 22
A	0.201	0.295
ALPHA-C	1.2E-08	1.4E-08
ALPHA-D	1.9E-08	4.2E-09
Y-S	5.0E-04	8.0E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	7.55E 05	1.53E 06
4.00E-10	7.58E 05	1.54E 06
7.00E-10	7.62E 05	1.54E 06
1.00E-09	7.70E 05	1.55E 06
1.50E-09	7.88E 05	1.58E 06
2.00E-09	8.13E 05	1.61E 06
2.50E-09	8.44E 05	1.65E 06
3.00E-09	8.80E 05	1.70E 06
3.50E-09	9.21E 05	1.76E 06
4.00E-09	9.67E 05	1.82E 06
4.50E-09	1.02E 06	1.89E 06
5.00E-09	1.07E 06	1.96E 06
5.50E-09	1.13E 06	2.04E 06
6.00E-09	1.19E 06	2.13E 06
6.50E-09	1.26E 06	2.22E 06
7.00E-09	1.33E 06	2.31E 06
8.00E-09	1.48E 06	2.51E 06
9.00E-09	1.63E 06	2.72E 06
1.00E-08	1.80E 06	2.93E 06
1.20E-08	2.16E 06	3.38E 06
1.40E-08	2.54E 06	3.82E 06
1.70E-08	3.11E 06	4.44E 06
2.00E-08	3.64E 06	4.97E 06
2.25E-08	4.04E 06	5.32E 06
2.50E-08	4.38E 06	5.58E 06
2.75E-08	4.66E 06	5.75E 06
3.00E-08	4.88E 06	5.84E 06
3.50E-08	5.17E 06	5.85E 06
4.00E-08	5.41E 06	5.76E 06
5.00E-08	5.11E 06	5.04E 06
7.50E-08	3.16E 06	2.89E 06
1.00E-07	2.06E 06	1.77E 06
2.00E-07	4.04E 05	3.06E 05
3.00E-07	1.36E 05	9.40E 04

NA = 1 NB = 3
T = 4.00E 06 Z = 8.0E 00

ALPHA-S	1.8E-07		
NE	1.0E 21	1.0E 22	1.0E 23
A	0.142	0.208	0.306
ALPHA-C	9.8E-09	1.2E-08	1.4E-08
ALPHA-D	2.7E-08	5.9E-09	1.3E-09
Y-S	2.5E-04	4.0E-03	7.0E-02

ALPHA	S(ALPHA)		
0.00E 00	4.48E 05	8.93E 05	1.64E 06
4.00E-10	4.50E 05	8.95E 05	1.64E 06
7.00E-10	4.54E 05	9.00E 05	1.65E 06
1.00E-09	4.59E 05	9.07E 05	1.66E 06
1.50E-09	4.73E 05	9.25E 05	1.68E 06
2.00E-09	4.90E 05	9.48E 05	1.71E 06
2.50E-09	5.12E 05	9.78E 05	1.76E 06
3.00E-09	5.38E 05	1.01E 06	1.81E 06
3.50E-09	5.66E 05	1.05E 06	1.87E 06
4.00E-09	5.98E 05	1.10E 06	1.93E 06
4.50E-09	6.34E 05	1.15E 06	2.00E 06
5.00E-09	6.72E 05	1.20E 06	2.08E 06
5.50E-09	7.13E 05	1.26E 06	2.16E 06
6.00E-09	7.57E 05	1.32E 06	2.25E 06
6.50E-09	8.04E 05	1.38E 06	2.34E 06
7.00E-09	8.54E 05	1.45E 06	2.44E 06
8.00E-09	9.63E 05	1.59E 06	2.64E 06
9.00E-09	1.08E 06	1.75E 06	2.85E 06
1.00E-08	1.21E 06	1.91E 06	3.07E 06
1.20E-08	1.49E 06	2.26E 06	3.53E 06
1.40E-08	1.80E 06	2.62E 06	3.98E 06
1.70E-08	2.29E 06	3.16E 06	4.61E 06
2.00E-08	2.79E 06	3.67E 06	5.14E 06
2.25E-08	3.19E 06	4.05E 06	5.48E 06
2.50E-08	3.55E 06	4.38E 06	5.73E 06
2.75E-08	3.88E 06	4.64E 06	5.88E 06
3.00E-08	4.15E 06	4.85E 06	5.96E 06
3.50E-08	4.58E 06	5.14E 06	5.94E 06
4.00E-08	4.98E 06	5.35E 06	5.80E 06
5.00E-09	4.96E 06	5.05E 06	5.03E 06
7.50E-09	3.31E 06	3.14E 06	2.85E 06
1.00E-07	2.25E 06	2.05E 06	1.73E 06
2.00E-07	4.81E 05	4.03E 05	2.90E 05
3.00E-07	1.66E 05	1.34E 05	8.54E 04

NA = 1 NB = 4
T = 1.00E 06 Z = 8.0E 00

ALPHA-S	2.9E-07	
NE	1.0E 20	1.0E 21
A	0.193	0.284
ALPHA-C	1.8E-08	2.2E-08
ALPHA-D	6.0E-08	1.3E-08
Y-S	4.0E-04	7.0E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	9.35E 06	6.61E 06
3.00E-11	9.35E 06	6.61E 06
7.00E-11	9.35E 06	6.61E 06
1.00E-10	9.35E 06	6.61E 06
2.00E-10	9.35E 06	6.61E 06
4.00E-10	9.34E 06	6.61E 06
6.00E-10	9.32E 06	6.60E 05
8.00E-10	9.29E 06	6.59E 06
1.00E-09	9.25E 06	6.58E 06
2.00E-09	8.96E 06	6.49E 06
4.00E-09	7.96E 06	6.16E 06
6.00E-09	6.74E 06	5.69E 06
8.00E-09	5.57E 06	5.15E 06
1.00E-08	4.59E 06	4.61E 06
1.20E-08	3.81E 06	4.12E 06
1.40E-08	3.21E 06	3.69E 05
1.60E-08	2.75E 06	3.33E 06
1.80E-08	2.41E 06	3.03E 06
2.00E-08	2.15E 06	2.79E 05
2.25E-08	1.91E 06	2.55E 06
2.50E-08	1.74E 06	2.37E 06
2.75E-08	1.62E 06	2.24E 06
3.00E-08	1.55E 06	2.15E 06
3.50E-08	1.47E 06	2.04E 06
4.00E-08	1.45E 06	2.00E 06
4.50E-08	1.48E 06	1.99E 06
5.00E-08	1.52E 06	2.01E 06
7.50E-08	1.70E 06	2.03E 06
1.00E-07	1.81E 06	1.93E 06
2.50E-07	5.55E 05	4.67E 05
5.00E-07	9.44E 04	7.26E 04
7.50E-07	3.11E 04	2.25E 04
1.00E-06	1.57E 04	9.99E 03

NA = 1 NB = 4
T = 2.00E 06 Z = 8.0E 00

ALPHA-S	2.9E-07		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.137	0.201	0.295
ALPHA-C	1.5E-08	1.9E-08	2.6E-08
ALPHA-D	8.5E-08	1.8E-08	4.0E-09
Y-S	2.0E-04	3.5E-03	7.0E-02

ALPHA	----------	S(ALPHA)	--------
0.00E 00	1.21E 07	8.08E 06	6.66E 06
3.00E-11	1.21E 07	8.08E 06	6.66E 06
7.00E-11	1.21E 07	8.08E 06	6.66E 06
1.00E-10	1.21E 07	8.08E 06	6.66E 06
2.00E-10	1.21E 07	8.07E 06	6.66E 06
4.00E-10	1.20E 07	8.07E 06	6.66E 06
6.00E-10	1.20E 07	8.05E 06	6.65E 06
8.00E-10	1.19E 07	8.04E 06	6.64E 06
1.00E-09	1.19E 07	8.01E 06	6.63E 06
2.00E-09	1.12E 07	7.83E 06	6.54E 06
4.00E-09	9.24E 06	7.17E 06	6.20E 06
6.00E-09	7.17E 06	6.31E 06	5.72E 06
8.00E-09	5.48E 06	5.42E 06	5.18E 06
1.00E-08	4.24E 06	4.61E 06	4.64E 06
1.20E-08	3.36E 06	3.93E 06	4.15E 06
1.40E-08	2.73E 06	3.38E 06	3.72E 06
1.60E-08	2.27E 06	2.95E 06	3.36E 06
1.80E-08	1.95E 06	2.60E 06	3.06E 06
2.00E-08	1.70E 06	2.33E 06	2.82E 06
2.25E-08	1.49E 06	2.08E 06	2.58E 06
2.50E-08	1.35E 06	1.90E 06	2.41E 06
2.75E-08	1.25E 06	1.76E 06	2.28E 06
3.00E-08	1.18E 06	1.67E 06	2.19E 06
3.50E-08	1.13E 06	1.57E 06	2.09E 06
4.00E-08	1.13E 06	1.53E 06	2.05E 06
4.50E-08	1.16E 06	1.54E 06	2.05E 06
5.00E-08	1.22E 06	1.57E 06	2.07E 06
7.50E-08	1.47E 06	1.71E 06	2.08E 06
1.00E-07	1.68E 06	1.80E 06	1.95E 06
2.50E-07	6.21E 05	5.53E 05	4.48E 05
5.00E-07	1.11E 05	9.39E 04	6.56E 04
7.50E-07	3.56E 04	3.08E 04	1.89E 04
1.00E-06	1.90E 04	1.53E 04	7.98E 03

NA = 1 NB = 4
T = 4.00E 06 Z = 8.0E 00

ALPHA-S	2.9E-07		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.097	0.142	0.208
ALPHA-C	1.3E-08	1.5E-08	1.9E-08
ALPHA-D	1.2E-07	2.6E-08	5.6E-09
Y-S	1.0E-04	2.0E-03	3.5E-02

ALPHA	----------	S(ALPHA)	--------
0.00E 00	1.58E 07	1.02E 07	7.77E 06
3.00E-11	1.58E 07	1.02E 07	7.77E 06
7.00E-11	1.58E 07	1.02E 07	7.77E 06
1.00E-10	1.58E 07	1.02E 07	7.77E 06
2.00E-10	1.58E 07	1.02E 07	7.77E 06
4.00E-10	1.57E 07	1.01E 07	7.76E 06
6.00E-10	1.56E 07	1.01E 07	7.75E 06
8.00E-10	1.55E 07	1.01E 07	7.74E 06
1.00E-09	1.53E 07	1.00E 07	7.72E 06
2.00E-09	1.39E 07	9.65E 06	7.55E 06
4.00E-09	1.03E 07	8.38E 06	6.97E 06
6.00E-09	7.17E 06	6.89E 06	6.19E 06
8.00E-09	5.07E 06	5.54E 06	5.37E 06
1.00E-08	3.71E 06	4.45E 06	4.61E 06
1.20E-08	2.82E 06	3.62E 06	3.96E 06
1.40E-08	2.23E 06	3.00E 06	3.43E 06
1.60E-08	1.82E 06	2.53E 06	3.00E 06
1.80E-08	1.54E 06	2.18E 06	2.66E 06
2.00E-08	1.33E 06	1.92E 06	2.40E 06
2.25E-08	1.16E 06	1.68E 06	2.14E 06
2.50E-08	1.04E 06	1.51E 06	1.95E 06
2.75E-08	9.66E 05	1.39E 06	1.82E 06
3.00E-08	9.20E 05	1.31E 06	1.73E 06
3.50E-08	8.84E 05	1.22E 06	1.62E 06
4.00E-08	8.98E 05	1.20E 06	1.58E 06
4.50E-08	9.42E 05	1.22E 06	1.58E 06
5.00E-08	1.01E 06	1.26E 06	1.61E 06
7.50E-08	1.29E 06	1.48E 06	1.74E 06
1.00E-07	1.56E 06	1.68E 06	1.81E 06
2.50E-07	6.73E 05	6.20E 05	5.43E 05
5.00E-07	1.23E 05	1.11E 05	8.96E 04
7.50E-07	3.75E 04	3.59E 04	2.85E 04
1.00E-06	2.17E 04	1.87E 04	1.42E 04

NA = 1 NB = 5
T = 1.00E 06 Z = 8.0E 00

ALPHA-S	4.4E-07		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.132	0.193	0.284
ALPHA-C	2.3E-08	2.7E-08	3.3E-08
ALPHA-D	2.7E-07	5.9E-08	1.3E-08
Y-S	1.2E-04	2.4E-03	4.8E-02

ALPHA	----------	S(ALPHA)	--------
0.00E 00	4.80E 05	8.05E 05	1.22E 06
1.00E-09	4.82E 05	8.07E 05	1.22E 06
2.00E-09	4.85E 05	8.10E 05	1.23E 06
4.00E-09	4.98E 05	8.22E 05	1.24E 06
6.00E-09	5.19E 05	8.43E 05	1.26E 06
8.00E-09	5.47E 05	8.70E 05	1.29E 06
1.00E-08	5.82E 05	9.04E 05	1.32E 06
1.20E-08	6.23E 05	9.44E 05	1.36E 06
1.40E-08	6.70E 05	9.88E 05	1.41E 06
1.60E-08	7.22E 05	1.04E 06	1.46E 06
1.80E-08	7.79E 05	1.09E 06	1.51E 06
2.00E-08	8.39E 05	1.14E 06	1.56E 06
2.20E-08	9.01E 05	1.20E 06	1.61E 06
2.40E-08	9.66E 05	1.25E 06	1.66E 06
2.60E-08	1.03E 06	1.31E 06	1.71E 06
2.80E-08	1.10E 06	1.37E 06	1.76E 06
3.00E-08	1.17E 06	1.42E 06	1.81E 06
3.40E-08	1.30E 06	1.53E 06	1.89E 06
3.80E-08	1.42E 06	1.62E 06	1.96E 06
4.20E-08	1.53E 06	1.71E 06	2.01E 06
4.60E-08	1.63E 06	1.78E 06	2.05E 06
5.00E-08	1.72E 06	1.84E 06	2.08E 06
5.50E-08	1.82E 06	1.90E 06	2.09E 06
6.00E-08	1.91E 06	1.93E 06	2.09E 06
6.50E-08	1.96E 06	1.94E 06	2.06E 06
7.00E-08	1.93E 06	1.92E 06	2.02E 06
8.00E-08	1.79E 06	1.81E 06	1.91E 06
9.00E-08	1.68E 06	1.70E 06	1.79E 06
1.00E-07	1.58E 06	1.60E 06	1.68E 06
1.50E-07	1.20E 06	1.22E 06	1.26E 06
2.00E-07	1.05E 06	1.02E 06	9.91E 05
3.00E-07	6.30E 05	5.98E 05	5.28E 05
4.00E-07	3.77E 05	3.39E 05	2.77E 05
5.00E-07	2.32E 05	2.02E 05	1.57E 05
6.00E-07	1.48E 05	1.27E 05	9.53E 04
8.00E-07	6.70E 04	5.82E 04	4.16E 04
1.00E-06	3.61E 04	3.15E 04	2.18E 04

NA = 1 NB = 5
T = 2.00E 06 Z = 8.0E 00

ALPHA-S	4.4E-07		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.093	0.132	0.201
ALPHA-C	1.9E-08	2.3E-08	2.8E-08
ALPHA-D	3.9E-07	8.3E-08	1.8E-08
Y-S	6.3E-05	1.2E-03	2.4E-02

ALPHA	S(ALPHA)		
0.00E 00	3.26E 05	5.54E 05	8.47E 05
1.00E-09	3.27E 05	5.55E 05	8.48E 05
2.00E-09	3.30E 05	5.58E 05	8.51E 05
4.00E-09	3.41E 05	5.69E 05	8.63E 05
6.00E-09	3.60E 05	5.89E 05	8.83E 05
8.00E-09	3.85E 05	6.14E 05	9.10E 05
1.00E-08	4.16E 05	6.46E 05	9.43E 05
1.20E-08	4.53E 05	6.84E 05	9.82E 05
1.40E-08	4.96E 05	7.27E 05	1.03E 06
1.60E-08	5.44E 05	7.75E 05	1.07E 06
1.80E-08	5.97E 05	8.26E 05	1.12E 06
2.00E-08	6.54E 05	8.80E 05	1.18E 06
2.20E-08	7.15E 05	9.37E 05	1.23E 06
2.40E-08	7.79E 05	9.96E 05	1.29E 06
2.60E-08	8.45E 05	1.06E 06	1.34E 06
2.80E-08	9.13E 05	1.12E 06	1.40E 06
3.00E-08	9.81E 05	1.18E 06	1.45E 06
3.40E-08	1.12E 06	1.30E 06	1.55E 06
3.80E-08	1.25E 06	1.41E 06	1.64E 06
4.20E-08	1.37E 06	1.51E 06	1.72E 06
4.60E-08	1.48E 06	1.60E 06	1.79E 06
5.00E-08	1.59E 06	1.69E 06	1.85E 06
5.50E-08	1.71E 06	1.78E 06	1.90E 06
6.00E-08	1.85E 06	1.85E 06	1.93E 06
6.50E-08	1.94E 06	1.89E 06	1.94E 06
7.00E-08	1.89E 06	1.87E 06	1.91E 06
8.00E-08	1.75E 06	1.76E 06	1.81E 06
9.00E-08	1.65E 06	1.66E 06	1.70E 06
1.00E-07	1.56E 06	1.56E 06	1.60E 06
1.50E-07	1.19E 06	1.20E 06	1.22E 06
2.00E-07	1.06E 06	1.04E 06	1.02E 06
3.00E-07	6.48E 05	6.31E 05	5.93E 05
4.00E-07	4.05E 05	3.77E 05	3.33E 05
5.00E-07	2.56E 05	2.32E 05	1.97E 05
6.00E-07	1.65E 05	1.48E 05	1.23E 05
8.00E-07	7.30E 04	6.74E 04	5.55E 04
1.00E-06	3.91E 04	3.63E 04	2.97E 04

NA = 1 NB = 5
T = 4.00E 06 Z = 8.0E 00

ALPHA-S	4.4E-07		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.066	0.097	0.142
ALPHA-C	1.6E-08	1.9E-08	2.3E-08
ALPHA-D	5.5E-07	1.2E-07	2.5E-08
Y-S	3.0E-05	6.0E-04	1.2E-02

ALPHA	S(ALPHA)		
0.00E 00	2.26E 05	3.86E 05	5.97E 05
1.00E-09	2.27E 05	3.87E 05	5.98E 05
2.00E-09	2.30E 05	3.90E 05	6.01E 05
4.00E-09	2.40E 05	4.00E 05	6.12E 05
6.00E-09	2.57E 05	4.18E 05	6.30E 05
8.00E-09	2.79E 05	4.41E 05	6.55E 05
1.00E-08	3.07E 05	4.71E 05	6.86E 05
1.20E-08	3.40E 05	5.06E 05	7.22E 05
1.40E-08	3.80E 05	5.46E 05	7.64E 05
1.60E-08	4.24E 05	5.91E 05	8.09E 05
1.80E-08	4.74E 05	6.40E 05	8.59E 05
2.00E-08	5.28E 05	6.93E 05	9.11E 05
2.20E-08	5.86E 05	7.50E 05	9.65E 05
2.40E-08	6.48E 05	8.09E 05	1.02E 06
2.60E-08	7.13E 05	8.70E 05	1.08E 06
2.80E-08	7.79E 05	9.33E 05	1.14E 06
3.00E-08	8.48E 05	9.96E 05	1.19E 06
3.40E-08	9.85E 05	1.12E 06	1.31E 06
3.80E-08	1.12E 06	1.24E 06	1.41E 06
4.20E-08	1.25E 06	1.36E 06	1.51E 06
4.60E-08	1.36E 06	1.47E 06	1.60E 06
5.00E-08	1.48E 06	1.56E 06	1.68E 06
5.50E-08	1.62E 06	1.68E 06	1.77E 06
6.00E-08	1.80E 06	1.80E 06	1.83E 06
6.50E-08	1.95E 06	1.86E 06	1.86E 06
7.00E-08	1.86E 06	1.84E 06	1.85E 06
8.00E-08	1.71E 06	1.72E 06	1.75E 06
9.00E-08	1.63E 06	1.63E 06	1.65E 06
1.00E-07	1.56E 06	1.54E 06	1.56E 06
1.50E-07	1.18E 06	1.19E 06	1.20E 06
2.00E-07	1.06E 06	1.05E 06	1.03E 06
3.00E-07	6.55E 05	6.50E 05	6.29E 05
4.00E-07	4.23E 05	4.05E 05	3.74E 05
5.00E-07	2.77E 05	2.56E 05	2.29E 05
6.00E-07	1.78E 05	1.65E 05	1.46E 05
8.00E-07	7.58E 04	7.40E 04	6.60E 04
1.00E-06	4.04E 04	3.95E 04	3.53E 04

NA = 1 NB = 6
T = 4.00E 06 Z = 8.0E 00

ALPHA-S	6.2E-07	
NE	1.0E 19	1.0E 20
A	0.066	0.097
ALPHA-C	2.2E-08	2.7E-08
ALPHA-D	5.4E-07	1.2E-07
Y-S	1.0E-04	2.0E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	4.61E 06	3.11E 06
1.00E-09	4.58E 06	3.10E 06
2.00E-09	4.49E 06	3.08E 06
4.00E-09	4.16E 06	2.98E 06
6.00E-09	3.71E 06	2.82E 06
8.00E-09	3.23E 06	2.64E 06
1.00E-08	2.77E 06	2.47E 06
1.20E-08	2.36E 06	2.32E 06
1.40E-08	2.02E 06	2.02E 06
1.60E-08	1.73E 06	1.83E 06
1.80E-08	1.50E 06	1.66E 06
2.00E-08	1.31E 06	1.51E 06
2.20E-08	1.15E 06	1.38E 06
2.40E-08	1.02E 06	1.26E 06
2.60E-08	9.18E 05	1.16E 06
2.80E-08	8.32E 05	1.07E 06
3.00E-08	7.60E 05	9.91E 05
3.40E-08	6.52E 05	8.68E 05
3.80E-08	5.77E 05	7.77E 05
4.20E-08	5.26E 05	7.11E 05
4.60E-08	4.92E 05	6.63E 05
5.00E-08	4.71E 05	6.29E 05
5.50E-08	4.57E 05	6.02E 05
6.00E-08	4.54E 05	5.88E 05
6.50E-08	4.60E 05	5.84E 05
7.00E-08	4.71E 05	5.86E 05
8.00E-08	5.01E 05	6.03E 05
9.00E-08	5.39E 05	6.31E 05
1.00E-07	5.80E 05	6.64E 05
2.00E-07	7.73E 05	7.99E 05
3.00E-07	7.07E 05	6.89E 05
4.00E-07	5.28E 05	5.18E 05
5.00E-07	3.70E 05	3.58E 05
7.00E-07	2.01E 05	1.88E 05
1.00E-06	8.24E 04	7.76E 04

NA = 1 NB = 7
T = 4.00E 06 Z = 8.0E 00

ALPHA-S	8.3E-07	
NE	1.0E 19	1.0E 20
A	0.066	0.097
ALPHA-C	3.0E-08	3.6E-08
ALPHA-D	5.4E-07	1.2E-07
Y-S	3.2E-04	6.5E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	2.46E 05	3.49E 05
2.00E-09	2.47E 05	3.50E 05
4.00E-09	2.49E 05	3.52E 05
6.00E-09	2.52E 05	3.55E 05
7.00E-09	2.55E 05	3.57E 05
8.00E-09	2.57E 05	3.59E 05
9.00E-09	2.60E 05	3.62E 05
1.00E-08	2.63E 05	3.65E 05
1.10E-08	2.67E 05	3.68E 05
1.20E-08	2.70E 05	3.71E 05
1.30E-08	2.74E 05	3.75E 05
1.40E-08	2.79E 05	3.79E 05
1.60E-08	2.88E 05	3.87E 05
1.80E-08	2.99E 05	3.97E 05
2.00E-08	3.11E 05	4.07E 05
2.50E-08	3.45E 05	4.37E 05
3.00E-08	3.84E 05	4.70E 05
3.50E-08	4.27E 05	5.08E 05
4.00E-08	4.74E 05	5.47E 05
5.00E-08	5.70E 05	6.27E 05
6.00E-08	6.64E 05	7.03E 05
7.00E-08	7.51E 05	7.70E 05
8.00E-08	8.26E 05	8.22E 05
1.00E-07	8.63E 05	8.51E 05
1.20E-07	8.26E 05	8.21E 05
1.50E-07	7.61E 05	7.59E 05
1.70E-07	7.19E 05	7.20E 05
2.00E-07	6.61E 05	6.71E 05
2.50E-07	6.32E 05	6.38E 05
3.00E-07	5.64E 05	5.79E 05
5.00E-07	4.25E 05	4.18E 05
7.00E-07	2.63E 05	2.52E 05
1.00E-06	1.34E 05	1.24E 05
2.00E-06	2.11E 04	1.97E 04
3.00E-06	6.01E 03	5.81E 03

NA = 1 NB = 2
T = 1.00E 06 Z = 1.0E 01

ALPHA-S	3.8E-08
NE	1.0E 21
A	0.284
ALPHA-C	2.8E-09
ALPHA-D	9.3E-09
Y-S	6.0E-05

ALPHA	S(ALPHA)
0.00E 00	5.16E 08
3.00E-11	5.13E 08
1.00E-10	4.86E 08
3.00E-10	3.30E 08
5.00E-10	2.02E 08
7.00E-10	1.28E 08
1.00E-09	7.34E 07
1.50E-09	3.74E 07
2.00E-09	2.38E 07
3.00E-09	1.46E 07
5.00E-09	1.17E 07
7.00E-09	1.14E 07
1.00E-08	9.66E 06
1.50E-08	5.83E 06
2.00E-08	3.22E 06
2.50E-08	1.82E 06
3.00E-08	1.08E 06
3.50E-08	6.76E 05
4.00E-08	4.45E 05
4.50E-08	3.15E 05
5.00E-08	2.17E 05
6.00E-08	1.21E 05
7.00E-08	7.54E 04
1.00E-07	2.73E 04

NA = 1 NB = 2
T = 2.00E 06 Z = 1.0E 01

ALPHA-S	3.8E-08	
NE	1.0E 21	1.0E 22
A	0.201	0.295
ALPHA-C	2.4E-09	2.9E-09
ALPHA-D	1.3E-08	2.8E-09
Y-S	3.0E-05	4.0E-04

ALPHA	--- S(ALPHA) ---	
0.00E 00	6.87E 08	3.95E 08
3.00E-11	6.80E 08	3.95E 08
1.00E-10	6.17E 08	3.82E 08
3.00E-10	3.41E 08	2.98E 08
5.00E-10	1.80E 08	2.08E 08
7.00E-10	1.06E 08	1.44E 08
1.00E-09	5.72E 07	8.78E 07
1.50E-09	2.78E 07	4.67E 07
2.00E-09	1.70E 07	2.99E 07
3.00E-09	9.87E 06	1.78E 07
5.00E-09	7.86E 06	1.30E 07
7.00E-09	8.44E 06	1.19E 07
1.00E-08	8.60E 06	9.74E 06
1.50E-08	6.51E 06	5.73E 06
2.00E-08	4.11E 06	3.15E 06
2.50E-08	2.53E 06	1.78E 06
3.00E-08	1.59E 06	1.06E 06
3.50E-08	1.04E 06	6.67E 05
4.00E-08	7.04E 05	4.41E 05
4.50E-08	5.19E 05	3.10E 05
5.00E-08	3.54E 05	2.18E 05
6.00E-08	2.05E 05	1.23E 05
7.00E-08	1.32E 05	7.63E 04
1.00E-07	5.22E 04	2.71E 04

NA = 1 NB = 2
T = 4.00E 06 Z = 1.0E 01

ALPHA-S	3.8E-08		
NE	1.0E 21	1.0E 22	1.0E 23
A	0.142	0.208	0.306
ALPHA-C	2.0E-09	2.4E-09	3.0E-09
ALPHA-D	1.9E-08	4.0E-09	8.6E-10
Y-S	1.4E-05	1.8E-04	2.5E-03

ALPHA	----------	S(ALPHA)	--------
0.00E 00	9.22E 08	5.20E 08	3.16E 08
3.00E-11	9.05E 08	5.17E 08	3.15E 08
1.00E-10	7.66E 08	4.89E 08	3.09E 08
3.00E-10	3.26E 08	3.29E 08	2.62E 08
5.00E-10	1.52E 08	2.00E 08	2.02E 08
7.00E-10	8.46E 07	1.26E 08	1.51E 08
1.00E-09	4.39E 07	7.13E 07	9.89E 07
1.50E-09	2.07E 07	3.55E 07	5.54E 07
2.00E-09	1.25E 07	2.19E 07	3.61E 07
3.00E-09	6.98E 06	1.23E 07	2.12E 07
5.00E-09	5.50E 06	8.85E 06	1.43E 07
7.00E-09	6.27E 06	8.92E 06	1.25E 07
1.00E-08	7.22E 06	8.73E 06	9.84E 06
1.50E-08	6.64E 06	6.43E 06	5.61E 06
2.00E-08	4.73E 06	4.04E 06	3.09E 06
2.50E-08	3.12E 06	2.48E 06	1.75E 06
3.00E-08	2.04E 06	1.56E 06	1.05E 06
3.50E-08	1.38E 06	1.02E 06	6.62E 05
4.00E-08	9.58E 05	6.91E 05	4.40E 05
4.50E-08	7.30E 05	5.02E 05	3.08E 05
5.00E-08	4.92E 05	3.51E 05	2.19E 05
6.00E-08	2.91E 05	2.03E 05	1.24E 05
7.00E-08	1.91E 05	1.31E 05	7.71E 04
1.00E-07	7.23E 04	5.20E 04	2.64E 04

NA = 1 NB = 3
T = 1.00E 06 Z = 1.0E 01

ALPHA-S	6.0E-08	
NE	1.0E 20	1.0E 21
A	0.193	0.284
ALPHA-C	3.8E-09	4.6E-09
ALPHA-D	3.6E-08	7.8E-09
Y-S	3.5E-05	5.0E-04

ALPHA	--- S(ALPHA) ---	
0.00E 00	1.63E 06	4.02E 06
3.00E-11	1.63E 06	4.02E 06
1.00E-10	1.64E 06	4.02E 06
3.00E-10	1.68E 06	4.08E 06
5.00E-10	1.75E 06	4.20E 06
7.00E-10	1.86E 06	4.37E 06
1.00E-09	2.09E 06	4.70E 06
1.50E-09	2.58E 06	5.52E 06
2.00E-09	3.19E 06	6.51E 06
3.00E-09	4.78E 06	8.84E 06
5.00E-09	8.72E 06	1.38E 07
7.00E-09	1.25E 07	1.75E 07
1.00E-08	1.58E 07	1.91E 07
1.20E-08	1.63E 07	1.83E 07
1.40E-08	1.59E 07	1.68E 07
1.50E-08	1.55E 07	1.59E 07
1.60E-08	1.49E 07	1.49E 07
1.80E-08	1.36E 07	1.31E 07
2.00E-08	1.22E 07	1.14E 07
2.20E-08	1.10E 07	9.93E 06
2.50E-08	9.23E 06	8.05E 06
3.00E-08	6.89E 06	5.72E 06
3.50E-08	5.16E 06	4.09E 06
4.00E-08	3.91E 06	2.99E 06
4.50E-08	3.00E 06	2.23E 06
5.00E-08	2.32E 06	1.68E 06
6.00E-08	1.45E 06	1.01E 06
7.00E-08	9.54E 05	6.45E 05
8.00E-08	6.56E 05	4.34E 05
9.00E-08	4.73E 05	3.06E 05
1.00E-07	3.47E 05	2.23E 05

NA = 1 NB = 3
T = 2.00E 06 Z = 1.0E 01

ALPHA-S	6.0E-08		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.137	0.201	0.295
ALPHA-C	3.2E-09	3.8E-09	4.6E-09
ALPHA-D	5.1E-08	1.1E-08	2.4E-09
Y-S	1.8E-05	2.5E-04	4.0E-03

ALPHA	----------	S(ALPHA)	--------
0.00E 00	9.11E 05	2.08E 06	4.76E 06
3.00E-11	9.11E 05	2.08E 06	4.77E 06
1.00E-10	9.15E 05	2.10E 06	4.77E 06
3.00E-10	9.43E 05	2.12E 06	4.83E 06
5.00E-10	9.94E 05	2.30E 06	4.93E 06
7.00E-10	1.07E 06	2.40E 06	5.09E 06
1.00E-09	1.22E 06	2.52E 06	5.41E 06
1.50E-09	1.54E 06	3.20E 06	6.15E 06
2.00E-09	1.94E 06	3.62E 06	7.11E 06
3.00E-09	3.04E 06	5.16E 06	9.35E 06
5.00E-09	5.94E 06	8.95E 06	1.40E 07
7.00E-09	9.12E 06	1.25E 07	1.75E 07
1.00E-08	1.27E 07	1.57E 07	1.89E 07
1.20E-08	1.40E 07	1.62E 07	1.81E 07
1.40E-08	1.44E 07	1.57E 07	1.65E 07
1.50E-08	1.43E 07	1.53E 07	1.57E 07
1.60E-08	1.41E 07	1.47E 07	1.47E 07
1.80E-08	1.34E 07	1.34E 07	1.29E 07
2.00E-08	1.25E 07	1.21E 07	1.13E 07
2.20E-08	1.14E 07	1.08E 07	9.82E 06
2.50E-08	9.90E 06	9.12E 06	7.96E 06
3.00E-08	7.67E 06	6.82E 06	5.65E 06
3.50E-08	5.96E 06	5.10E 06	4.04E 06
4.00E-08	4.65E 06	3.87E 06	2.96E 06
4.50E-08	3.66E 06	3.10E 06	2.20E 06
5.00E-08	2.89E 06	2.29E 06	1.66E 06
6.00E-08	1.86E 06	1.43E 06	1.00E 06
7.00E-08	1.25E 06	9.45E 05	6.41E 05
8.00E-08	8.72E 05	6.51E 05	4.31E 05
9.00E-08	6.36E 05	4.69E 05	3.03E 05
1.00E-07	4.65E 05	3.46E 05	2.20E 05

NA = 1 NB = 3
T = 4.00E 06 , Z = 1.0E 01

ALPHA-S	6.0E-08			
NE	1.0E 20	1.0E 21	1.0E 22	1.0E 23
A	0.093	0.142	0.208	0.306
ALPHA-C	2.7E-09	3.2E-09	3.9E-09	4.7E-09
ALPHA-D	7.2E-08	1.6E-08	3.4E-09	7.2E-10
Y-S	9.0E-06	1.2E-04	2.0E-03	4.0E-02

ALPHA	S(ALPHA)			
0.00E 00	5.50E 05	1.18E 06	2.54E 06	5.29E 06
3.00E-11	5.51E 05	1.18E 06	2.54E 06	5.29E 06
1.00E-10	5.54E 05	1.18E 06	2.54E 06	5.30E 06
3.00E-10	5.77E 05	1.21E 06	2.58E 06	5.35E 06
5.00E-10	6.14E 05	1.26E 06	2.65E 06	5.46E 06
7.00E-10	6.72E 05	1.33E 06	2.75E 06	5.62E 06
1.00E-09	7.78E 05	1.48E 06	2.95E 06	5.94E 06
1.50E-09	1.01E 06	1.80E 06	3.44E 06	6.66E 06
2.00E-09	1.31E 06	2.20E 06	4.05E 06	7.65E 06
3.00E-09	2.12E 06	3.28E 06	5.55E 06	9.88E 06
5.00E-09	4.24E 06	6.13E 06	9.19E 06	1.45E 07
7.00E-09	6.59E 06	9.22E 06	1.26E 07	1.78E 07
1.00E-08	1.05E 07	1.27E 07	1.56E 07	1.91E 07
1.20E-08	1.21E 07	1.39E 07	1.60E 07	1.81E 07
1.40E-08	1.30E 07	1.43E 07	1.56E 07	1.65E 07
1.50E-08	1.33E 07	1.42E 07	1.51E 07	1.56E 07
1.60E-08	1.33E 07	1.40E 07	1.45E 07	1.46E 07
1.80E-08	1.30E 07	1.32E 07	1.33E 07	1.28E 07
2.00E-08	1.24E 07	1.23E 07	1.20E 07	1.12E 07
2.20E-08	1.16E 07	1.13E 07	1.07E 07	9.68E 06
2.50E-08	1.03E 07	9.78E 06	9.03E 06	7.83E 06
3.00E-08	8.24E 06	7.59E 06	6.75E 06	5.53E 06
3.50E-08	6.55E 06	5.89E 06	5.05E 06	3.94E 06
4.00E-08	5.21E 06	4.60E 06	3.83E 06	2.88E 06
4.50E-08	4.17E 06	3.62E 06	2.93E 06	2.14E 06
5.00E-08	3.33E 06	2.85E 06	2.27E 06	1.61E 06
6.00E-08	2.21E 06	1.84E 06	1.42E 06	9.65E 05
7.00E-08	1.49E 06	1.24E 06	9.34E 05	6.13E 05
8.00E-08	1.05E 06	8.66E 05	6.44E 05	4.09E 05
9.00E-08	7.69E 05	6.30E 05	4.63E 05	2.85E 05
1.00E-07	5.57E 05	4.64E 05	3.42E 05	2.05E 05

NA = 1 NB = 4
T = 1.00E 06 Z = 1.0E 01

ALPHA-S	9.7E-08		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.132	0.193	0.284
ALPHA-C	5.0E-09	6.0E-09	7.3E-09
ALPHA-D	1.6E-07	3.4E-08	7.4E-09
Y-S	1.4E-05	2.0E-04	3.6E-03

ALPHA	S(ALPHA)		
0.00E 00	5.31E 07	3.17E 07	2.16E 07
3.00E-11	5.30E 07	3.17E 07	2.16E 07
1.00E-10	5.29E 07	3.16E 07	2.16E 07
3.00E-10	5.12E 07	3.13E 07	2.15E 07
5.00E-10	4.81E 07	3.06E 07	2.13E 07
7.00E-10	4.41E 07	2.97E 07	2.11E 07
1.00E-09	3.76E 07	2.78E 07	2.05E 07
1.50E-09	2.76E 07	2.42E 07	1.93E 07
2.00E-09	2.02E 07	2.05E 07	1.79E 07
2.50E-09	1.51E 07	1.72E 07	1.63E 07
3.00E-09	1.16E 07	1.45E 07	1.48E 07
4.00E-09	7.51E 06	1.05E 07	1.22E 07
5.00E-09	5.38E 06	8.02E 06	1.03E 07
7.00E-09	3.54E 06	5.54E 06	7.89E 06
1.00E-08	2.89E 06	4.41E 06	6.54E 06
1.50E-08	3.23E 06	4.51E 06	6.37E 06
2.00E-08	3.86E 06	5.02E 06	6.54E 06
2.50E-08	4.37E 06	5.34E 06	6.43E 06
3.00E-08	4.64E 06	5.35E 06	6.01E 06
3.50E-08	4.69E 06	5.13E 06	5.42E 06
4.00E-08	4.53E 06	4.73E 06	4.74E 06
4.50E-08	4.28E 06	4.28E 06	4.10E 06
5.00E-08	3.96E 06	3.82E 06	3.52E 06
6.00E-08	3.23E 06	2.94E 06	2.54E 06
7.00E-08	2.57E 06	2.24E 06	1.85E 06
8.00E-08	2.01E 06	1.70E 06	1.35E 06
9.00E-08	1.58E 06	1.30E 06	1.01E 06
1.00E-07	1.24E 06	1.01E 06	7.62E 05
2.00E-07	1.92E 05	1.48E 05	1.02E 05
3.00E-07	6.16E 04	4.90E 04	3.21E 04

NA = 1 NB = 4
T = 2.00E 06 Z = 1.0E 01

ALPHA-S	9.7E-08			
NE	1.0E 19	1.0E 20	1.0E 21	1.0E 22
A	0.093	0.137	0.201	0.295
ALPHA-C	4.2E-09	5.1E-09	6.1E-09	7.4E-09
ALPHA-D	2.3E-07	4.9E-08	1.0E-08	2.3E-09
Y-S	6.8E-06	1.0E-04	1.8E-03	3.4E-02

ALPHA	S(ALPHA)			
0.00E 00	7.10E 07	4.13E 07	2.65E 07	2.06E 07
3.00E-11	7.09E 07	4.13E 07	2.65E 07	2.06E 07
1.00E-10	7.04E 07	4.12E 07	2.65E 07	2.06E 07
3.00E-10	6.65E 07	4.04E 07	2.63E 07	2.05E 07
5.00E-10	5.98E 07	3.89E 07	2.59E 07	2.04E 07
7.00E-10	5.20E 07	3.68E 07	2.54E 07	2.02E 07
1.00E-09	4.07E 07	3.31E 07	2.43E 07	1.97E 07
1.50E-09	2.67E 07	2.66E 07	2.19E 07	1.87E 07
2.00E-09	1.80E 07	2.09E 07	1.94E 07	1.74E 07
2.50E-09	1.28E 07	1.65E 07	1.69E 07	1.61E 07
3.00E-09	9.51E 06	1.32E 07	1.47E 07	1.47E 07
4.00E-09	5.89E 06	8.88E 06	1.11E 07	1.23E 07
5.00E-09	4.13E 06	6.50E 06	8.79E 06	1.05E 07
7.00E-09	2.66E 06	4.22E 06	6.17E 06	8.16E 06
1.00E-08	2.18E 06	3.26E 06	4.81E 06	6.81E 06
1.50E-08	2.52E 06	3.39E 06	4.69E 06	6.58E 06
2.00E-08	3.14E 06	3.95E 06	5.10E 06	6.70E 06
2.50E-08	3.70E 06	4.41E 06	5.37E 06	6.53E 06
3.00E-08	4.09E 06	4.65E 06	5.36E 06	6.05E 06
3.50E-08	4.29E 06	4.68E 06	5.12E 06	5.43E 06
4.00E-08	4.31E 06	4.51E 06	4.71E 06	4.72E 06
4.50E-08	4.19E 06	4.25E 06	4.26E 06	4.07E 06
5.00E-08	3.98E 06	3.92E 06	3.80E 06	3.47E 06
6.00E-08	3.39E 06	3.19E 06	2.92E 06	2.49E 06
7.00E-08	2.79E 06	2.54E 06	2.22E 06	1.80E 06
8.00E-08	2.24E 06	1.99E 06	1.69E 06	1.31E 06
9.00E-08	1.79E 06	1.56E 06	1.29E 06	9.70E 05
1.00E-07	1.43E 06	1.23E 06	1.00E 06	7.31E 05
2.00E-07	2.26E 05	1.93E 05	1.47E 05	9.25E 04
3.00E-07	7.10E 04	6.23E 04	4.83E 04	2.70E 04

NA = 1 NB = 4
T = 4.00E 06 Z = 1.0E 01

ALPHA-S	9.7E-08			
NE	1.0E 19	1.0E 20	1.0E 21	1.0E 22
A	0.066	0.097	0.142	0.208
ALPHA-C	3.5E-09	4.2E-09	5.2E-09	6.2E-09
ALPHA-D	3.2E-07	6.9E-08	1.5E-08	3.2E-09
Y-S	3.4E-06	5.2E-05	9.0E-04	1.7E-02

ALPHA	S(ALPHA)			
0.00E 00	9.54E 07	5.46E 07	3.38E 07	2.43E 07
3.00E-11	9.53E 07	5.45E 07	3.38E 07	2.43E 07
1.00E-10	9.41E 07	5.43E 07	3.38E 07	2.43E 07
3.00E-10	8.51E 07	5.25E 07	3.33E 07	2.41E 07
5.00E-10	7.14E 07	4.92E 07	3.25E 07	2.39E 07
7.00E-10	5.75E 07	4.50E 07	3.13E 07	2.34E 07
1.00E-09	4.07E 07	3.80E 07	2.91E 07	2.26E 07
1.50E-09	2.38E 07	2.76E 07	2.48E 07	2.07E 07
2.00E-09	1.51E 07	2.00E 07	2.06E 07	1.87E 07
2.50E-09	1.03E 07	1.49E 07	1.70E 07	1.66E 07
3.00E-09	7.51E 06	1.14E 07	1.40E 07	1.45E 07
4.00E-09	4.54E 06	7.24E 06	9.90E 06	1.14E 07
5.00E-09	3.14E 06	5.11E 06	7.38E 06	9.15E 06
7.00E-09	2.02E 06	3.23E 06	4.85E 06	6.53E 06
1.00E-08	1.70E 06	2.48E 06	3.63E 06	5.08E 06
1.50E-08	2.08E 06	2.66E 06	3.57E 06	4.86E 06
2.00E-08	2.69E 06	3.20E 06	4.03E 06	5.21E 06
2.50E-08	3.27E 06	3.73E 06	4.45E 06	5.44E 06
3.00E-08	3.72E 06	4.09E 06	4.66E 06	5.40E 06
3.50E-08	4.00E 06	4.28E 06	4.67E 06	5.14E 06
4.00E-08	4.13E 06	4.28E 06	4.50E 06	4.71E 06
4.50E-08	4.08E 06	4.16E 06	4.23E 06	4.25E 06
5.00E-08	3.96E 06	3.94E 06	3.89E 06	3.78E 06
6.00E-08	3.49E 06	3.36E 06	3.17E 06	2.89E 06
7.00E-08	2.92E 06	2.76E 06	2.52E 06	2.20E 06
8.00E-08	2.40E 06	2.22E 06	1.98E 06	1.65E 06
9.00E-08	1.95E 06	1.77E 06	1.55E 06	1.27E 06
1.00E-07	1.57E 06	1.42E 06	1.22E 06	9.80E 05
2.00E-07	2.49E 05	2.28E 05	1.92E 05	1.40E 05
3.00E-07	7.75E 04	7.20E 04	6.22E 04	4.50E 04

NA = 1 NB = 5
T = 1.00E 06 Z = 1.0E 01

ALPHA-S	1.4E-07		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.132	0.193	0.000
ALPHA-C	7.4E-09	9.0E-09	1.1E-08
ALPHA-D	1.6E-07	3.4E-08	7.2E-09
Y-S	6.0E-05	1.0E-03	1.4E-02

ALPHA	S(ALPHA)		
0.00E 00	1.29E 06	2.36E 06	3.83E 06
1.00E-09	1.32E 06	2.40E 06	3.87E 06
3.00E-09	1.57E 06	2.66E 06	4.13E 06
7.00E-09	2.59E 06	3.67E 06	5.08E 06
1.00E-08	3.58E 06	4.54E 06	5.79E 06
1.50E-08	5.00E 06	5.63E 06	6.46E 06
2.00E-08	6.04E 06	6.16E 06	6.48E 06
2.50E-08	5.70E 06	5.84E 06	6.01E 06
3.00E-08	5.13E 06	5.25E 06	5.40E 06
4.00E-08	4.32E 06	4.36E 06	4.46E 06
5.00E-08	3.65E 06	3.69E 06	3.74E 06
7.00E-08	2.90E 06	2.90E 06	2.82E 06
1.00E-07	1.89E 06	1.74E 06	1.45E 06
2.00E-07	4.33E 05	3.53E 05	2.54E 05
3.00E-07	1.34E 05	1.20E 05	1.16E 05
5.00E-07	3.10E 04	2.74E 04	1.72E 04
7.00E-07	1.09E 04	9.78E 03	5.78E 03
1.00E-06	3.46E 03	3.41E 03	2.19E 03

NA = 1 NB = 5
T = 2.00E 06 Z = 1.0E 01

ALPHA-S	1.4E-07		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.093	0.137	0.201
ALPHA-C	6.2E-09	7.5E-09	9.1E-09
ALPHA-D	2.2E-07	4.7E-08	1.0E-08
Y-S	2.5E-05	5.0E-04	9.0E-03

ALPHA	----------	S(ALPHA)	--------
0.00E 00	8.26E 05	1.53E 06	2.56E 06
1.00E-09	8.52E 05	1.56E 06	2.60E 06
3.00E-09	1.05E 06	1.79E 06	2.84E 06
7.00E-09	1.94E 06	2.73E 06	3.79E 06
1.00E-08	2.89E 06	3.63E 06	4.60E 06
1.50E-08	4.40E 06	4.94E 06	5.61E 06
2.00E-08	5.74E 06	5.83E 06	6.08E 06
2.50E-08	5.42E 06	5.60E 06	5.78E 06
3.00E-08	4.98E 06	5.08E 06	5.23E 06
4.00E-08	4.28E 06	4.29E 06	4.35E 06
5.00E-08	3.61E 06	3.64E 06	3.68E 06
7.00E-08	2.86E 06	2.90E 06	2.90E 06
1.00E-07	1.97E 06	1.88E 06	1.73E 06
2.00E-07	4.99E 05	4.33E 05	3.44E 05
3.00E-07	1.51E 05	1.35E 05	1.17E 05
5.00E-07	3.23E 04	3.18E 04	2.53E 04
7.00E-07	1.14E 04	1.11E 04	8.53E 03
1.00E-06	3.24E 03	3.51E 03	2.73E 03

NA = 1 NB = 5
T = 4.00E 05 Z = 1.0E 01

ALPHA-S	1.4E-07		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.066	0.097	0.142
ALPHA-C	5.2E-09	6.3E-09	7.7E-09
ALPHA-D	3.1E-07	6.7E-08	1.4E-08
Y-S	1.5E-05	2.5E-04	5.0E-03

ALPHA	S(ALPHA)		
0.00E 00	5.47E 05	1.01E 06	1.71E 06
1.00E-09	5.69E 05	1.03E 06	1.74E 06
3.00E-09	7.29E 05	1.22E 06	1.96E 06
7.00E-09	1.91E 06	2.07E 06	2.84E 06
1.00E-08	2.41E 06	2.95E 06	3.68E 06
1.50E-08	3.92E 06	4.37E 06	4.92E 06
2.00E-08	5.47E 06	5.55E 06	5.72E 06
2.50E-08	5.17E 06	5.36E 06	5.54E 06
3.00E-08	4.87E 06	4.93E 06	5.05E 06
4.00E-08	4.26E 06	4.25E 06	4.27E 06
5.00E-08	3.59E 06	3.60E 06	3.64E 06
7.00E-08	2.83E 06	2.87E 06	2.90E 06
1.00E-07	2.02E 06	1.96E 06	1.88E 06
2.00E-07	5.51E 05	5.00E 05	4.28E 05
3.00E-07	1.63E 05	1.52E 05	1.33E 05
5.00E-07	3.15E 04	3.38E 04	3.07E 04
7.00E-07	1.15E 04	1.17E 04	1.04E 04
1.00E-06	2.89E 03	3.40E 03	3.05E 03

NA = 1 NB = 5
T = 4.00E 06 Z = 1.0E 01

ALPHA-S	2.0E-07		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.066	0.097	0.142
ALPHA-C	7.3E-09	8.9E-09	1.1E-08
ALPHA-D	3.1E-07	6.6E-08	1.4E-08
Y-S	4.7E-05	9.0E-04	1.8E-02

ALPHA	----------	S(ALPHA)	--------
0.00E 00	1.63E 07	1.05E 07	8.14E 06
1.00E-09	1.50E 07	1.02E 07	8.00E 06
3.00E-09	9.23E 06	8.11E 06	7.03E 06
7.00E-09	3.33E 06	4.18E 06	4.54E 06
1.00E-08	2.00E 06	2.78E 06	3.33E 06
1.50E-08	1.32E 06	1.87E 06	2.41E 06
2.00E-08	1.23E 06	1.66E 06	2.15E 06
2.50E-08	1.36E 06	1.72E 06	2.16E 06
3.00E-08	1.53E 06	1.86E 06	2.27E 06
4.00E-08	1.93E 06	2.20E 06	2.55E 06
5.00E-08	2.55E 06	2.60E 06	2.80E 06
7.00E-08	2.30E 06	2.40E 06	2.51E 06
1.00E-07	2.16E 06	2.10E 06	2.07E 06
2.00E-07	8.26E 05	7.70E 05	6.96E 05
3.00E-07	3.49E 05	3.13E 05	2.64E 05
5.00E-07	7.76E 04	7.24E 04	6.11E 04

NA = 1 NB = 7
T = 4.00E 06 Z = 1.0E 01

ALPHA-S	2.7E-07		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.066	0.097	0.142
ALPHA-C	9.8E-09	1.2E-08	1.4E-08
ALPHA-D	3.1E-07	6.6E-08	1.4E-08
Y-S	1.4E-04	3.0E-03	6.0E-02

ALPHA	S(ALPHA)		
0.00E 00	6.31E 05	9.73E 05	1.32E 06
1.00E-09	6.35E 05	9.77E 05	1.32E 06
3.00E-09	6.72E 05	1.01E 06	1.36E 06
7.00E-09	8.49E 05	1.18E 06	1.53E 06
1.00E-08	1.06E 06	1.37E 06	1.72E 06
1.50E-08	1.50E 06	1.75E 06	2.09E 06
2.00E-08	1.96E 06	2.13E 06	2.42E 06
2.50E-08	2.37E 06	2.44E 06	2.67E 06
3.00E-08	2.61E 06	2.59E 06	2.77E 06
4.00E-08	2.47E 06	2.49E 06	2.62E 06
5.00E-08	2.29E 06	2.30E 06	2.40E 06
7.00E-08	1.95E 06	2.00E 06	2.09E 06
1.00E-07	1.66E 06	1.72E 06	1.81E 06
2.00E-07	9.97E 05	9.71E 05	9.20E 05
3.00E-07	5.10E 05	4.69E 05	4.11E 05
5.00E-07	1.49E 05	1.32E 05	1.08E 05
7.00E-07	5.29E 04	4.83E 04	3.87E 04
1.00E-06	2.35E 04	2.08E 04	1.65E 04

NA = 1 NB = 2
T = 2.00E 06 Z = 1.2E 01

ALPHA-S	1.5E-08
NE	1.0E 22
A	0.295
ALPHA-C	1.2E-09
ALPHA-D	1.8E-09
Y-S	2.2E-04

ALPHA	S(ALPHA)
0.00E 00	1.18E 09
3.00E-12	1.18E 09
1.00E-11	1.17E 09
3.00E-11	1.15E 09
5.00E-11	1.09E 09
7.00E-11	1.03E 09
1.00E-10	9.05E 08
1.50E-10	7.04E 08
2.00E-10	5.37E 08
2.50E-10	4.13E 08
3.00E-10	3.23E 08
4.00E-10	2.09E 08
5.00E-10	1.47E 08
7.50E-10	7.70E 07
1.00E-09	5.20E 07
1.50E-09	3.67E 07
2.00E-09	3.34E 07
3.00E-09	3.05E 07
4.00E-09	2.54E 07
5.00E-09	2.07E 07
7.00E-09	1.04E 07
1.00E-08	3.97E 06
1.50E-08	1.12E 06
2.00E-08	4.17E 05
2.50E-08	2.14E 05
3.00E-08	1.14E 05

NA = 1 NB = 2
T = 4.00E 06 Z = 1.2E 01

ALPHA-S	1.5E-08	
NE	1.0E 22	1.0E 23
A	0.208	0.306
ALPHA-C	9.8E-10	1.2E-09
ALPHA-D	2.5E-09	5.4E-10
Y-S	1.1E-04	1.4E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	1.56E 09	9.25E 08
3.00E-12	1.56E 09	9.25E 08
1.00E-11	1.55E 09	9.23E 08
3.00E-11	1.49E 09	9.10E 08
5.00E-11	1.37E 09	8.85E 08
7.00E-11	1.23E 09	8.49E 08
1.00E-10	1.02E 09	7.82E 08
1.50E-10	7.08E 08	6.56E 08
2.00E-10	4.98E 08	5.36E 08
2.50E-10	3.61E 08	4.35E 08
3.00E-10	2.71E 08	3.54E 08
4.00E-10	1.67E 08	2.42E 08
5.00E-10	1.13E 08	1.75E 08
7.50E-10	5.61E 07	9.43E 07
1.00E-09	3.62E 07	6.33E 07
1.50E-09	2.41E 07	4.25E 07
2.00E-09	2.20E 07	3.68E 07
3.00E-09	2.24E 07	3.18E 07
4.00E-09	2.19E 07	2.58E 07
5.00E-09	2.07E 07	2.07E 07
7.00E-09	1.35E 07	1.01E 07
1.00E-08	6.19E 06	3.81E 06
1.50E-08	1.92E 06	1.11E 06
2.00E-08	7.60E 05	4.25E 05
2.50E-08	4.46E 05	2.14E 05
3.00E-08	2.18E 05	1.19E 05

NA = 1 NB = 2
T = 8.00E 06 Z = 1.2E 01

ALPHA-S	1.5E-08		
NE	1.0E 22	1.0E 23	1.0E 24
A	0.147	0.216	0.317
ALPHA-C	8.1E-10	9.9E-10	1.2E-09
ALPHA-D	3.6E-09	7.7E-10	1.7E-10
Y-S	5.5E-05	7.1E-04	1.0E-02

ALPHA	S(ALPHA)		
0.00E 00	2.08E 09	1.21E 09	7.66E 08
3.00E-12	2.08E 09	1.21E 09	7.66E 08
1.00E-11	2.06E 09	1.20E 09	7.66E 08
3.00E-11	1.91E 09	1.17E 09	7.58E 08
5.00E-11	1.68E 09	1.12E 09	7.44E 08
7.00E-11	1.42E 09	1.04E 09	7.23E 08
1.00E-10	1.06E 09	9.15E 08	6.82E 08
1.50E-10	6.61E 08	7.04E 08	6.00E 08
2.00E-10	4.32E 08	5.32E 08	5.15E 08
2.50E-10	3.00E 08	4.06E 08	4.35E 08
3.00E-10	2.18E 08	3.15E 08	3.67E 08
4.00E-10	1.30E 08	2.02E 08	2.64E 08
5.00E-10	8.59E 07	1.40E 08	1.96E 08
7.50E-10	4.12E 07	7.06E 07	1.10E 08
1.00E-09	2.57E 07	4.52E 07	7.37E 07
1.50E-09	1.63E 07	2.87E 07	4.80E 07
2.00E-09	1.50E 07	2.48E 07	4.01E 07
3.00E-09	1.68E 07	2.37E 07	3.31E 07
4.00E-09	1.86E 07	2.25E 07	2.63E 07
5.00E-09	1.91E 07	2.11E 07	2.06E 07
7.00E-09	1.45E 07	1.33E 07	9.81E 06
1.00E-08	7.52E 06	6.13E 06	3.63E 06
1.50E-08	2.71E 06	1.89E 06	1.10E 06
2.00E-08	1.13E 06	7.60E 05	4.27E 05
2.50E-08	7.33E 05	4.22E 05	2.12E 05
3.00E-08	3.16E 05	2.21E 05	1.20E 05

NA = 1 NB = 3
T = 2.00E 06 Z = 1.2E 01

ALPHA-S	2.4E-09	
NE	1.0E 21	1.0E 22
A	0.201	0.295
ALPHA-C	1.5E-09	1.9E-09
ALPHA-D	7.0E-09	1.5E-09
Y-S	2.0E-04	2.5E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	4.93E 06	1.22E 07
3.00E-10	5.63E 06	1.34E 07
1.00E-09	1.12E 07	2.25E 07
1.50E-09	1.72E 07	3.11E 07
2.00E-09	2.38E 07	3.92E 07
2.50E-09	3.01E 07	4.55E 07
3.00E-09	3.53E 07	4.94E 07
3.50E-09	3.91E 07	5.10E 07
4.00E-09	4.13E 07	5.06E 07
4.50E-09	4.22E 07	4.89E 07
5.00E-09	4.20E 07	4.64E 07
5.50E-09	4.10E 07	4.33E 07
6.00E-09	3.95E 07	4.01E 07
6.50E-09	3.72E 07	3.66E 07
7.00E-09	3.51E 07	3.35E 07
7.50E-09	3.29E 07	3.06E 07
8.00E-09	3.07E 07	2.79E 07
9.00E-09	2.66E 07	2.31E 07
1.00E-08	2.29E 07	1.91E 07
1.50E-08	1.09E 07	7.87E 06
2.00E-08	5.48E 06	3.64E 06
2.50E-08	3.02E 06	1.90E 06
3.00E-08	1.77E 06	1.09E 06
3.50E-08	1.11E 06	6.76E 05
4.00E-08	7.17E 05	4.44E 05
4.50E-08	4.95E 05	3.11E 05
5.00E-08	3.59E 05	2.28E 05
6.50E-08	1.59E 05	1.08E 05

NA = 1 NB = 3
T = 4.00E 06 Z = 1.2E 01

ALPHA-S	2.4E-08		
NE	1.0E 21	1.0E 22	1.0E 23
A	0.142	0.208	0.306
ALPHA-C	1.3E-09	1.6E-09	1.9E-09
ALPHA-D	9.9E-09	2.1E-09	4.6E-10
Y-S	8.0E-05	1.2E-03	2.0E-02

ALPHA	S(ALPHA)		
0.00E 00	2.65E 06	6.14E 06	1.40E 07
3.00E-10	3.12E 06	6.82E 06	1.51E 07
1.00E-09	6.62E 06	1.23E 07	2.40E 07
1.50E-09	1.07E 07	1.82E 07	3.24E 07
2.00E-09	1.57E 07	2.45E 07	4.03E 07
2.50E-09	2.07E 07	3.05E 07	4.64E 07
3.00E-09	2.53E 07	3.55E 07	5.00E 07
3.50E-09	2.94E 07	3.91E 07	5.13E 07
4.00E-09	3.24E 07	4.12E 07	5.07E 07
4.50E-09	3.45E 07	4.20E 07	4.88E 07
5.00E-09	3.57E 07	4.17E 07	4.61E 07
5.50E-09	3.61E 07	4.07E 07	4.30E 07
6.00E-09	3.60E 07	3.91E 07	3.97E 07
6.50E-09	3.50E 07	3.69E 07	3.62E 07
7.00E-09	3.40E 07	3.47E 07	3.31E 07
7.50E-09	3.27E 07	3.26E 07	3.01E 07
8.00E-09	3.12E 07	3.04E 07	2.74E 07
9.00E-09	2.79E 07	2.63E 07	2.27E 07
1.00E-08	2.48E 07	2.26E 07	1.87E 07
1.50E-08	1.31E 07	1.07E 07	7.64E 06
2.00E-08	7.15E 06	5.39E 06	3.52E 06
2.50E-08	4.17E 06	2.96E 06	1.83E 06
3.00E-08	2.52E 06	1.74E 06	1.05E 06
3.50E-08	1.63E 06	1.09E 06	6.57E 05
4.00E-08	1.07E 06	7.08E 05	4.33E 05
4.50E-08	7.47E 05	4.89E 05	3.03E 05
5.00E-08	5.48E 05	3.54E 05	2.22E 05
6.50E-08	2.47E 05	1.57E 05	1.05E 05

NA = 1 NB = 3
T = 8.00E 06 Z = 1.2E 01

ALPHA-S	2.4E-08		
NE	1.0E 21	1.0E 22	1.0E 23
A	0.100	0.147	0.216
ALPHA-C	1.1E-09	1.3E-09	1.6E-09
ALPHA-D	1.4E-08	3.0E-09	6.5E-10
Y-S	4.0E-05	7.0E-04	1.0E-02

ALPHA	S(ALPHA)		
0.00E 00	1.55E 06	3.35E 06	7.21E 06
3.00E-10	1.88E 06	3.79E 06	7.89E 06
1.00E-09	4.30E 06	7.32E 06	1.34E 07
1.50E-09	7.25E 06	1.14E 07	1.91E 07
2.00E-09	1.12E 07	1.62E 07	2.54E 07
2.50E-09	1.48E 07	2.11E 07	3.12E 07
3.00E-09	1.87E 07	2.56E 07	3.59E 07
3.50E-09	2.26E 07	2.96E 07	3.93E 07
4.00E-09	2.58E 07	3.25E 07	4.13E 07
4.50E-09	2.84E 07	3.45E 07	4.20E 07
5.00E-09	3.04E 07	3.56E 07	4.16E 07
5.50E-09	3.17E 07	3.60E 07	4.05E 07
6.00E-09	3.25E 07	3.58E 07	3.89E 07
6.50E-09	3.25E 07	3.48E 07	3.66E 07
7.00E-09	3.24E 07	3.37E 07	3.45E 07
7.50E-09	3.17E 07	3.23E 07	3.23E 07
8.00E-09	3.08E 07	3.08E 07	3.01E 07
9.00E-09	2.84E 07	2.76E 07	2.60E 07
1.00E-08	2.58E 07	2.45E 07	2.24E 07
1.50E-08	1.47E 07	1.29E 07	1.05E 07
2.00E-08	8.45E 06	7.05E 06	5.28E 06
2.50E-08	5.13E 06	4.09E 06	2.89E 06
3.00E-08	3.17E 06	2.48E 06	1.69E 06
3.50E-08	2.10E 06	1.60E 06	1.05E 06
4.00E-08	1.38E 06	1.06E 06	6.85E 05
4.50E-08	9.69E 05	7.39E 05	4.72E 05
5.00E-08	7.17E 05	5.42E 05	3.41E 05
6.50E-08	3.28E 05	2.44E 05	1.50E 05

NA = 1 NB = 4
T = 2.00E 06 Z = 1.2E 01

ALPHA-S	3.9E-08		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.137	0.201	0.295
ALPHA-C	2.0E-09	2.5E-09	3.0E-09
ALPHA-D	3.1E-08	6.6E-09	1.4E-09
Y-S	6.0E-05	8.5E-04	1.7E-02

ALPHA	----------	S(ALPHA)	--------
0.00E 00	1.17E 08	7.33E 07	5.46E 07
1.00E-10	1.15E 08	7.28E 07	5.44E 07
3.00E-10	9.94E 07	6.88E 07	5.30E 07
5.00E-10	7.83E 07	6.21E 07	5.05E 07
7.00E-10	5.55E 07	5.42E 07	4.71E 07
1.00E-09	3.97E 07	4.30E 07	4.15E 07
1.50E-09	2.26E 07	2.93E 07	3.29E 07
2.00E-09	1.48E 07	2.12E 07	2.66E 07
2.50E-09	1.10E 07	1.66E 07	2.25E 07
3.00E-09	9.11E 06	1.40E 07	2.00E 07
4.00E-09	7.79E 06	1.19E 07	1.77E 07
5.00E-09	7.83E 06	1.17E 07	1.73E 07
6.00E-09	8.47E 06	1.21E 07	1.75E 07
7.00E-09	9.19E 06	1.27E 07	1.78E 07
8.00E-09	9.91E 06	1.33E 07	1.78E 07
9.00E-09	1.06E 07	1.37E 07	1.76E 07
1.00E-08	1.11E 07	1.40E 07	1.71E 07
1.20E-08	1.17E 07	1.39E 07	1.57E 07
1.40E-08	1.18E 07	1.32E 07	1.38E 07
1.60E-08	1.14E 07	1.20E 07	1.18E 07
1.80E-08	1.07E 07	1.08E 07	1.01E 07
2.00E-08	9.89E 06	9.57E 06	8.48E 06
2.50E-08	7.64E 06	6.78E 06	5.44E 06
3.00E-08	5.70E 06	4.76E 06	3.55E 06
5.00E-08	1.76E 06	1.30E 06	8.42E 05
7.00E-08	6.83E 05	4.80E 05	2.98E 05
1.00E-07	2.36E 05	1.60E 05	1.01E 05

NA = 1 NB = 4
T = 4.00E 06 Z = 1.2E 01

ALPHA-S	3.9E-08			
NE	1.0E 20	1.0E 21	1.0E 22	1.0E 23
A	0.097	0.142	0.208	0.306
ALPHA-C	1.7E-09	2.1E-09	2.5E-09	3.0E-09
ALPHA-D	4.3E-08	9.4E-09	2.0E-09	4.3E-10
Y-S	2.8E-05	4.5E-04	8.5E-03	1.6E-01

ALPHA	S(ALPHA)			
0.00E 00	1.56E 08	9.41E 07	6.50E 07	5.82E 07
1.00E-10	1.50E 08	9.30E 07	6.46E 07	5.80E 07
3.00E-10	1.18E 08	8.45E 07	6.19E 07	5.63E 07
5.00E-10	8.25E 07	7.15E 07	5.71E 07	5.32E 07
7.00E-10	5.70E 07	5.83E 07	5.12E 07	4.92E 07
1.00E-09	3.47E 07	4.20E 07	4.22E 07	4.28E 07
1.50E-09	1.82E 07	2.56E 07	3.02E 07	3.33E 07
2.00E-09	1.15E 07	1.73E 07	2.25E 07	2.67E 07
2.50E-09	8.35E 06	1.29E 07	1.79E 07	2.26E 07
3.00E-09	6.80E 06	1.06E 07	1.51E 07	2.02E 07
4.00E-09	5.88E 06	8.72E 06	1.27E 07	1.82E 07
5.00E-09	5.85E 06	8.46E 06	1.23E 07	1.81E 07
6.00E-09	6.44E 06	8.91E 06	1.26E 07	1.84E 07
7.00E-09	7.10E 06	9.51E 06	1.31E 07	1.86E 07
8.00E-09	7.76E 06	1.02E 07	1.36E 07	1.86E 07
9.00E-09	8.46E 06	1.08E 07	1.39E 07	1.83E 07
1.00E-08	9.07E 06	1.12E 07	1.41E 07	1.77E 07
1.20E-08	1.00E 07	1.18E 07	1.39E 07	1.59E 07
1.40E-08	1.05E 07	1.18E 07	1.32E 07	1.39E 07
1.60E-08	1.06E 07	1.13E 07	1.20E 07	1.17E 07
1.80E-08	1.03E 07	1.07E 07	1.08E 07	9.82E 06
2.00E-08	9.85E 06	9.83E 06	9.51E 06	8.19E 06
2.50E-08	8.11E 06	7.56E 06	6.71E 06	5.13E 06
3.00E-08	6.33E 06	5.63E 06	4.69E 06	3.28E 06
5.00E-08	2.14E 06	1.74E 06	1.27E 06	7.35E 05
7.00E-08	8.51E 05	6.77E 05	4.63E 05	2.50E 05
1.00E-07	2.98E 05	2.34E 05	1.51E 05	8.18E 04

NA = 1 NB = 4
T = 8.00E 06 Z = 1.2E 01

ALPHA-S	3.9E-08			
NE	1.0E 20	1.0E 21	1.0E 22	1.0E 23
A	0.068	0.100	0.147	0.216
ALPHA-C	1.4E-09	1.7E-09	2.1E-09	2.6E-09
ALPHA-D	6.2E-08	1.3E-08	2.9E-09	6.2E-10
Y-S	1.5E-05	2.4E-04	4.0E-03	8.5E-02

ALPHA	S(ALPHA)			
0.00E 00	2.08E 08	1.23E 08	8.09E 07	6.56E 07
1.00E-10	1.55E 08	1.20E 08	8.02E 07	6.52E 07
3.00E-10	1.32E 08	1.03E 08	7.47E 07	6.24E 07
5.00E-10	8.04E 07	7.93E 07	6.58E 07	5.75E 07
7.00E-10	5.08E 07	5.93E 07	5.59E 07	5.15E 07
1.00E-09	2.87E 07	3.89E 07	4.26E 07	4.25E 07
1.50E-09	1.42E 07	2.15E 07	2.74E 07	3.04E 07
2.00E-09	8.80E 06	1.38E 07	1.90E 07	2.27E 07
2.50E-09	6.33E 06	1.00E 07	1.44E 07	1.81E 07
3.00E-09	5.13E 06	8.06E 06	1.17E 07	1.54E 07
4.00E-09	4.53E 06	6.63E 06	9.50E 06	1.31E 07
5.00E-09	4.55E 06	6.36E 06	9.01E 06	1.27E 07
6.00E-09	5.13E 06	6.80E 06	9.32E 06	1.30E 07
7.00E-09	5.78E 06	7.35E 06	9.83E 06	1.35E 07
8.00E-09	6.40E 06	7.97E 06	1.04E 07	1.40E 07
9.00E-09	7.12E 06	8.61E 06	1.10E 07	1.43E 07
1.00E-08	7.78E 06	9.18E 06	1.14E 07	1.45E 07
1.20E-08	8.86E 06	1.01E 07	1.19E 07	1.42E 07
1.40E-08	9.59E 06	1.05E 07	1.18E 07	1.33E 07
1.60E-08	9.97E 06	1.06E 07	1.14E 07	1.21E 07
1.80E-08	9.94E 06	1.03E 07	1.06E 07	1.07E 07
2.00E-08	9.66E 06	9.78E 06	9.78E 06	9.44E 06
2.50E-08	8.33E 06	8.03E 06	7.50E 06	6.57E 06
3.00E-08	6.75E 06	6.26E 06	5.57E 06	4.55E 06
5.00E-08	2.43E 06	2.12E 06	1.71E 06	1.19E 06
7.00E-08	9.79E 05	8.48E 05	6.63E 05	4.20E 05
1.00E-07	3.44E 05	2.98E 05	2.27E 05	1.32E 05

NA = 1 NB = 5
T = 2.00E 06 Z = 1.2E 01

ALPHA-S	5.8E-08		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.137	0.201	0.295
ALPHA-C	3.0E-09	3.7E-09	4.4E-09
ALPHA-D	3.0E-08	6.5E-09	1.4E-09
Y-S	2.3E-04	4.5E-03	9.5E-02

ALPHA	----------	S(ALPHA)	--------
0.00E 00	3.55E 06	6.49E 06	1.07E 07
3.00E-09	7.16E 06	1.03E 07	1.53E 07
5.00E-09	1.10E 07	1.36E 07	1.81E 07
7.00E-09	1.38E 07	1.55E 07	1.85E 07
8.00E-09	1.49E 07	1.59E 07	1.81E 07
9.00E-09	1.51E 07	1.57E 07	1.74E 07
1.00E-08	1.43E 07	1.50E 07	1.64E 07
1.50E-08	1.12E 07	1.16E 07	1.24E 07
2.00E-08	9.16E 06	9.36E 06	9.71E 06
2.50E-08	8.39E 06	8.17E 06	7.85E 06
3.00E-08	6.78E 06	6.64E 06	5.97E 06
4.00E-08	4.69E 06	4.31E 06	3.35E 06
5.00E-08	3.16E 06	2.72E 06	1.89E 06
6.00E-08	2.17E 06	1.76E 06	1.14E 06
8.00E-08	1.06E 06	8.04E 05	4.79E 05
1.00E-07	5.70E 05	4.19E 05	2.34E 05
1.50E-07	1.70E 05	1.25E 05	6.32E 04
2.00E-07	6.68E 04	5.05E 04	2.54E 04
2.50E-07	3.59E 04	2.49E 04	1.31E 04
3.00E-07	2.39E 04	1.52E 04	7.72E 03

NA = 1 NB = 5
T = 4.00E 06 Z = 1.2E 01

ALPHA-S	5.8E-08		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.097	0.142	0.208
ALPHA-C	2.5E-09	3.1E-09	3.7E-09
ALPHA-D	4.2E-08	9.2E-09	2.0E-09
Y-S	1.3E-04	2.3E-03	4.7E-02

ALPHA	S(ALPHA)		
0.00E 00	2.21E 06	4.08E 06	6.72E 06
3.00E-09	5.25E 06	7.46E 06	1.07E 07
5.00E-09	9.06E 06	1.10E 07	1.40E 07
7.00E-09	1.22E 07	1.37E 07	1.59E 07
8.00E-09	1.39E 07	1.46E 07	1.62E 07
9.00E-09	1.43E 07	1.48E 07	1.60E 07
1.00E-08	1.33E 07	1.41E 07	1.52E 07
1.50E-08	1.10E 07	1.12E 07	1.17E 07
2.00E-08	9.02E 06	9.15E 06	9.39E 06
2.50E-08	8.44E 06	8.29E 06	8.17E 06
3.00E-08	6.75E 06	6.79E 06	6.60E 06
4.00E-08	4.86E 06	4.68E 06	4.23E 06
5.00E-08	3.42E 06	3.14E 06	2.64E 06
6.00E-08	2.48E 06	2.15E 06	1.69E 06
8.00E-08	1.27E 06	1.05E 06	7.51E 05
1.00E-07	6.88E 05	5.63E 05	3.82E 05
1.50E-07	2.02E 05	1.67E 05	1.08E 05
2.00E-07	7.46E 04	6.54E 04	4.01E 04
2.50E-07	4.62E 04	3.46E 04	2.04E 04
3.00E-07	3.19E 04	2.28E 04	1.22E 04

NA = 1 NB = 5
T = 8.00E 06 Z = 1.2E 01

ALPHA-S	5.8E-08		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.068	0.100	0.147
ALPHA-C	2.1E-09	2.6E-09	3.1E-09
ALPHA-D	6.0E-08	1.3E-08	2.8E-09
Y-S	6.3E-05	1.0E-03	2.3E-02

ALPHA	S(ALPHA)		
0.00E 00	1.43E 06	2.62E 06	4.33E 06
3.00E-09	4.00E 06	5.53E 06	7.72E 06
5.00E-09	7.64E 06	9.13E 06	1.13E 07
7.00E-09	1.09E 07	1.22E 07	1.38E 07
8.00E-09	1.29E 07	1.36E 07	1.47E 07
9.00E-09	1.35E 07	1.39E 07	1.48E 07
1.00E-08	1.25E 07	1.32E 07	1.42E 07
1.50E-08	1.08E 07	1.09E 07	1.12E 07
2.00E-08	8.94E 06	9.01E 06	9.17E 06
2.50E-08	8.44E 06	8.33E 06	8.27E 06
3.00E-08	6.69E 06	6.76E 06	6.79E 06
4.00E-08	4.95E 06	4.86E 06	4.65E 06
5.00E-08	3.58E 06	3.42E 06	3.10E 06
6.00E-08	2.75E 06	2.45E 06	2.10E 06
8.00E-08	1.44E 06	1.26E 06	1.01E 06
1.00E-07	7.77E 05	6.86E 05	5.37E 05
1.50E-07	2.25E 05	2.02E 05	1.55E 05
2.00E-07	7.54E 04	7.55E 04	5.65E 04
2.50E-07	5.69E 04	4.51E 04	3.21E 04
3.00E-07	3.91E 04	3.11E 04	2.09E 04

NA = 1 NB = 6
T = 8.00E 06 Z = 1.2E 01

ALPHA-S	8.1E-08			
NE	1.0E 19	1.0E 20	1.0E 21	1.0E 22
A	0.047	0.068	0.100	0.147
ALPHA-C	2.5E-09	3.0E-09	3.6E-09	4.4E-09
ALPHA-D	2.8E-07	5.9E-08	1.3E-08	2.8E-09
Y-S	1.2E-05	2.2E-04	4.5E-03	9.3E-02

ALPHA	S(ALPHA)			
0.00E 00	5.90E 07	3.60E 07	2.50E 07	2.24E 07
3.00E-09	5.33E 06	7.71E 06	9.43E 06	1.02E 07
5.00E-09	2.64E 06	3.97E 06	5.39E 06	6.35E 06
7.00E-09	2.23E 06	3.13E 06	4.25E 06	5.31E 06
8.00E-09	2.24E 06	3.05E 06	4.09E 06	5.21E 06
9.00E-09	2.35E 06	3.09E 06	4.07E 06	5.25E 06
1.00E-08	2.52E 06	3.20E 06	4.14E 06	5.37E 06
1.50E-08	3.68E 06	4.21E 06	4.99E 06	6.22E 06
1.80E-08	4.27E 06	4.74E 06	5.41E 06	6.51E 06
2.00E-08	4.60E 06	5.02E 06	5.61E 06	6.59E 06
2.20E-08	4.80E 06	5.18E 06	5.71E 06	6.57E 06
2.40E-08	4.99E 06	5.31E 06	5.75E 06	6.48E 06
2.60E-08	5.11E 06	5.37E 06	5.74E 06	6.35E 06
2.80E-08	5.15E 06	5.37E 06	5.67E 06	6.18E 06
3.00E-08	5.16E 06	5.33E 06	5.57E 06	5.98E 06
3.20E-08	5.11E 06	5.25E 06	5.44E 06	5.76E 06
3.40E-08	5.06E 06	5.15E 06	5.29E 06	5.53E 06
3.60E-08	4.97E 06	5.03E 06	5.13E 06	5.30E 06
3.80E-08	4.87E 06	4.90E 06	4.96E 06	5.07E 06
4.00E-08	4.76E 06	4.76E 06	4.79E 06	4.85E 06
4.50E-08	4.44E 06	4.39E 06	4.35E 06	4.23E 06
5.00E-08	4.09E 06	4.02E 06	3.93E 06	3.78E 06
6.00E-08	3.43E 06	3.32E 06	3.17E 06	2.90E 06
8.00E-08	2.31E 06	2.17E 06	1.99E 06	1.69E 06
1.00E-07	1.54E 06	1.40E 06	1.24E 06	9.95E 05
1.50E-07	5.70E 05	5.11E 05	4.35E 05	3.22E 05
2.00E-07	2.42E 05	2.22E 05	1.89E 05	1.33E 05

NA = 1 NB = 7
T = 8.00E 06 Z = 1.2E 01

ALPHA-S	1.1E-07		
NE	1.0E 19	1.0E 20	1.0E 21
A	0.047	0.068	0.100
ALPHA-C	3.3E-09	4.0E-09	4.9E-09
ALPHA-D	2.7E-07	5.9E-08	1.3E-08
Y-S	3.5E-05	6.8E-04	1.4E-02

ALPHA	S(ALPHA)		
0.00E 00	9.48E 05	1.58E 06	2.37E 06
3.00E-09	1.51E 06	2.16E 06	2.96E 06
5.00E-09	2.46E 06	3.07E 06	3.85E 06
7.00E-09	3.63E 06	4.15E 06	4.84E 06
8.00E-09	4.22E 06	4.68E 06	5.30E 06
9.00E-09	4.79E 06	5.19E 06	5.73E 06
1.00E-08	5.40E 06	5.67E 06	6.10E 06
1.50E-08	5.93E 06	6.06E 06	6.32E 06
2.00E-08	5.60E 06	5.61E 06	5.76E 06
2.50E-08	5.05E 06	5.10E 06	5.24E 06
3.00E-08	4.60E 06	4.73E 06	4.91E 06
4.00E-08	4.00E 06	4.16E 06	4.36E 06
5.00E-08	3.61E 06	3.72E 06	3.84E 06
6.00E-08	3.36E 06	3.40E 06	3.43E 06
8.00E-08	2.53E 06	2.48E 06	2.41E 06
1.00E-07	1.89E 06	1.81E 06	1.69E 06
1.50E-07	8.62E 05	8.09E 05	7.15E 05
2.00E-07	4.55E 05	4.01E 05	3.40E 05
2.50E-07	2.07E 05	2.03E 05	1.74E 05
3.00E-07	1.25E 05	1.21E 05	1.02E 05

NA = 1 NB = 2
T = 1.20E 07 Z = 1.3E 01

ALPHA-S	1.0E-08
NE	1.0E 24
A	0.260
ALPHA-C	7.2E-10
ALPHA-D	1.6E-10
Y-S	5.4E-03

ALPHA	S(ALPHA)
0.00E 00	1.34E 09
2.00E-10	5.10E 08
4.00E-10	1.89E 08
6.00E-10	1.03E 08
8.00E-10	7.16E 07
1.00E-09	5.88E 07
1.40E-09	5.12E 07
1.80E-09	4.93E 07
2.20E-09	4.65E 07
2.60E-09	4.17E 07
3.00E-09	3.56E 07
3.50E-09	2.78E 07
4.00E-09	2.08E 07
4.50E-09	1.53E 07
5.00E-09	1.12E 07
5.50E-09	8.48E 06
6.00E-09	6.57E 06
7.00E-09	4.57E 06
8.00E-09	3.50E 06
9.00E-09	2.73E 06
1.00E-08	2.13E 06

NA = 1 NB = 3
T = 1.20E 07 Z = 1.3E 01

ALPHA-S	1.6E-08		
NE	1.0E 22	1.0E 23	1.0E 24
A	0.120	0.180	0.260
ALPHA-C	7.8E-10	9.6E-10	1.2E-09
ALPHA-D	3.0E-09	6.4E-10	1.4E-10
Y-S	2.9E-04	5.0E-03	9.6E-02

ALPHA	----------	S(ALPHA)	--------
0.00E 00	3.63E 06	8.07E 06	1.65E 07
4.00E-10	5.76E 06	1.14E 07	2.20E 07
7.00E-10	9.23E 06	1.69E 07	3.13E 07
1.00E-09	1.40E 07	2.40E 07	4.26E 07
1.50E-09	2.36E 07	3.71E 07	6.16E 07
2.00E-09	3.34E 07	4.84E 07	7.52E 07
2.50E-09	4.14E 07	5.57E 07	8.03E 07
3.00E-09	4.69E 07	5.86E 07	7.79E 07
3.50E-09	4.96E 07	5.82E 07	7.09E 07
4.00E-09	5.05E 07	5.59E 07	6.23E 07
4.50E-09	4.94E 07	5.19E 07	5.31E 07
5.00E-09	4.74E 07	4.78E 07	4.53E 07
5.50E-09	4.46E 07	4.34E 07	3.87E 07
6.00E-09	4.14E 07	3.92E 07	3.31E 07
6.50E-09	3.81E 07	3.53E 07	2.87E 07
7.00E-09	3.50E 07	3.18E 07	2.49E 07
8.00E-09	2.95E 07	2.58E 07	1.93E 07
9.00E-09	2.47E 07	2.10E 07	1.49E 07
1.00E-08	2.07E 07	1.71E 07	1.15E 07
1.20E-08	1.46E 07	1.15E 07	6.99E 06
1.40E-08	1.04E 07	7.98E 06	4.52E 06
1.70E-08	6.65E 06	4.91E 06	2.71E 06
2.00E-08	4.37E 06	3.16E 06	1.76E 06
2.25E-08	3.13E 06	2.24E 06	1.25E 06
2.50E-08	2.35E 06	1.67E 06	9.05E 05
2.75E-08	1.80E 06	1.27E 06	6.56E 05
3.00E-08	1.36E 06	9.60E 05	4.73E 05
3.50E-08	8.83E 05	6.15E 05	2.87E 05
4.00E-08	5.95E 05	4.13E 05	1.87E 05
5.00E-08	2.83E 05	2.19E 05	1.24E 05

NA = 1 NB = 4
T = 1.20E 07 Z = 1.3E 01

ALPHA-S	2.6E-08	
NE	1.0E 22	1.0E 23
A	0.120	0.180
ALPHA-C	1.3E-09	1.6E-09
ALPHA-D	2.8E-09	6.1E-10
Y-S	2.0E-03	4.0E-02

ALPHA	--- S(ALPHA) ---	
0.00E 00	1.45E 08	1.10E 08
3.00E-11	1.45E 08	1.10E 08
7.00E-11	1.43E 08	1.09E 08
1.00E-10	1.41E 08	1.08E 08
2.00E-10	1.29E 08	1.03E 08
4.00E-10	9.80E 07	8.72E 07
6.00E-10	7.00E 07	6.97E 07
8.00E-10	5.05E 07	5.49E 07
1.00E-09	3.76E 07	4.37E 07
2.00E-09	1.50E 07	2.06E 07
4.00E-09	1.20E 07	1.72E 07
6.00E-09	1.47E 07	1.96E 07
8.00E-09	1.63E 07	1.98E 07
1.00E-08	1.65E 07	1.83E 07
1.20E-08	1.55E 07	1.58E 07
1.40E-08	1.39E 07	1.33E 07
1.60E-08	1.21E 07	1.09E 07
1.80E-08	1.03E 07	8.94E 06
2.00E-08	8.80E 06	7.33E 06
2.25E-08	7.10E 06	5.70E 06
2.50E-08	5.72E 06	4.46E 06
2.75E-08	4.63E 06	3.53E 06
3.00E-08	3.78E 06	2.84E 06
3.50E-08	2.56E 06	1.87E 06
4.00E-08	1.79E 06	1.28E 06
4.50E-08	1.28E 06	9.05E 05
5.00E-08	9.60E 05	6.71E 05

NA = 1 NB = 5
T = 1.20E 07 Z = 1.3E 01

ALPHA-S	3.9E-08		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.056	0.082	0.120
ALPHA-C	1.3E-09	1.6E-09	1.9E-09
ALPHA-D	5.9E-08	1.3E-08	2.8E-09
Y-S	3.1E-05	5.7E-04	1.1E-02

ALPHA	S(ALPHA)		
0.00E 00	1.57E 06	2.92E 06	5.06E 06
1.00E-10	1.58E 06	2.93E 06	5.07E 06
2.00E-10	1.61E 06	2.97E 06	5.12E 06
4.00E-10	1.72E 06	3.11E 06	5.29E 06
7.00E-10	2.00E 06	3.46E 06	5.76E 06
1.00E-09	2.43E 06	3.99E 06	6.43E 06
2.00E-09	4.84E 06	6.78E 06	9.75E 06
3.00E-09	8.43E 06	1.05E 07	1.36E 07
4.00E-09	1.20E 07	1.39E 07	1.67E 07
5.00E-09	1.48E 07	1.63E 07	1.86E 07
6.00E-09	1.65E 07	1.76E 07	1.92E 07
7.00E-09	1.71E 07	1.79E 07	1.90E 07
8.00E-09	1.71E 07	1.75E 07	1.82E 07
9.00E-09	1.66E 07	1.68E 07	1.72E 07
1.00E-08	1.58E 07	1.58E 07	1.62E 07
1.10E-08	1.50E 07	1.50E 07	1.52E 07
1.20E-08	1.42E 07	1.41E 07	1.43E 07
1.30E-08	1.34E 07	1.33E 07	1.35E 07
1.40E-08	1.27E 07	1.26E 07	1.28E 07
1.60E-08	1.14E 07	1.14E 07	1.15E 07
1.80E-08	1.05E 07	1.05E 07	1.05E 07
2.00E-08	9.67E 06	9.63E 06	9.55E 06
2.20E-08	8.97E 06	8.88E 06	8.71E 06
2.40E-08	8.37E 06	8.20E 06	7.92E 06
2.60E-08	7.74E 06	7.54E 06	7.17E 06
2.80E-08	7.15E 06	6.90E 06	6.46E 06
3.00E-08	6.61E 06	6.32E 06	5.84E 06
3.40E-08	5.63E 06	5.25E 06	4.72E 06
3.80E-08	4.73E 06	4.34E 06	3.81E 06
4.20E-08	3.99E 06	3.59E 06	3.08E 06
4.60E-08	3.27E 06	2.95E 06	2.49E 06
5.00E-08	2.80E 06	2.46E 06	2.04E 06
5.50E-08	2.25E 06	1.96E 06	1.60E 06
6.00E-08	1.74E 06	1.55E 06	1.26E 06
6.50E-08	1.44E 06	1.26E 06	1.02E 06
7.00E-08	1.21E 06	1.04E 06	8.29E 05
8.00E-08	7.49E 05	6.75E 05	5.53E 05

AD-A060 954 NAVAL RESEARCH LAB WASHINGTON D C F/G 20/9
STARK PROFILE CALCULATIONS FOR LYMAN SERIES LINES OF ONE-ELECTR--ETC(U)
SEP 78 P C KEPPLE, H R GRIEM

UNCLASSIFIED NRL-MR-3634 NL

2 OF 2
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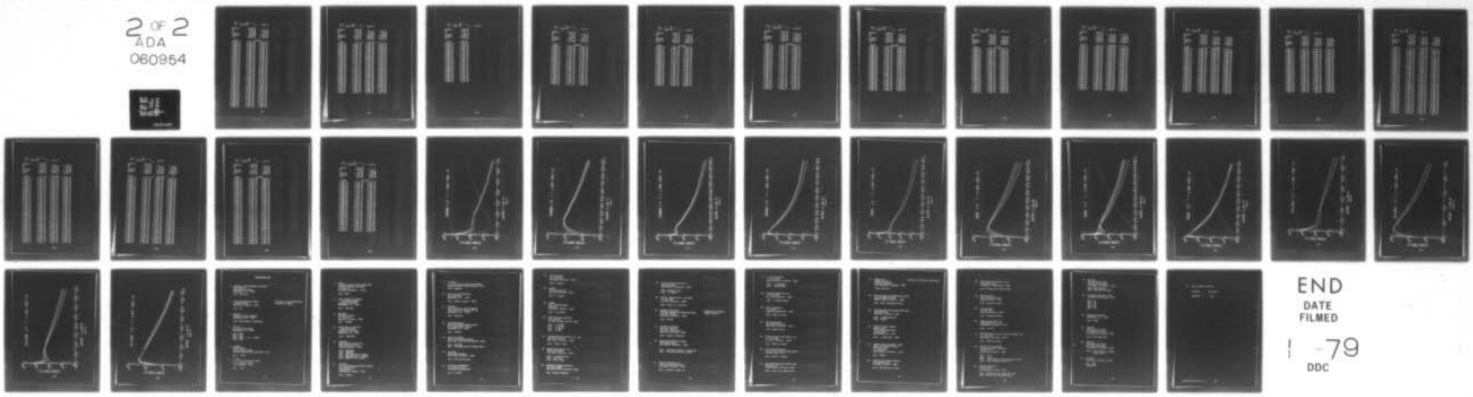

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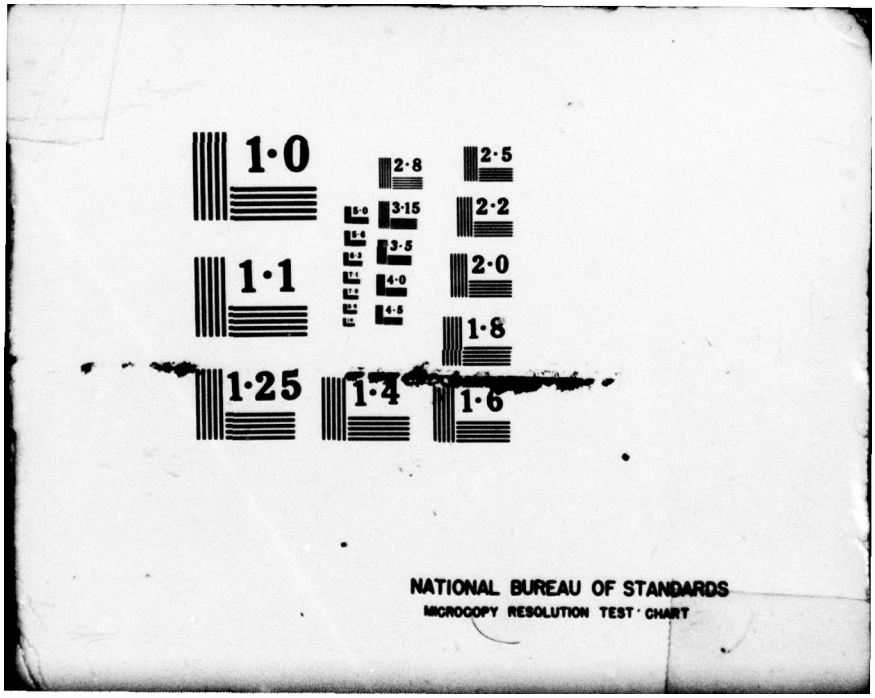
1·0
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NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

NA = 1 NB = 6
T = 1.20E 07 Z = 1.3E 01

ALPHA-S	5.4E-08	
NE	1.0E 21	1.0E 22
A	0.082	0.120
ALPHA-C	2.2E-09	2.6E-09
ALPHA-D	1.3E-08	2.7E-09
Y-S	2.2E-03	4.6E-02

ALPHA	--- S(ALPHA) ---	
0.00E 00	4.40E 07	3.63E 07
1.00E-10	4.37E 07	3.61E 07
2.00E-10	4.29E 07	3.57E 07
4.00E-10	3.99E 07	3.40E 07
7.00E-10	3.34E 07	3.02E 07
1.00E-09	2.69E 07	2.58E 07
2.00E-09	1.30E 07	1.46E 07
3.00E-09	7.84E 06	9.59E 06
4.00E-09	5.91E 06	7.60E 06
5.00E-09	5.28E 06	6.95E 06
6.00E-09	5.25E 06	6.94E 06
7.00E-09	5.51E 06	7.21E 06
8.00E-09	5.90E 06	7.59E 06
9.00E-09	6.34E 06	7.99E 06
1.00E-08	6.76E 06	8.36E 06
1.10E-08	7.15E 06	8.66E 06
1.20E-08	7.48E 06	8.89E 06
1.30E-08	7.76E 06	9.05E 06
1.40E-08	7.96E 06	9.14E 06
1.60E-08	8.18E 06	9.13E 06
1.80E-08	8.21E 06	8.93E 06
2.00E-08	8.08E 06	8.61E 06
2.20E-08	7.84E 06	8.20E 06
2.40E-08	7.54E 06	7.76E 06
2.60E-08	7.22E 06	7.32E 06
2.80E-08	6.87E 06	6.87E 06
3.00E-08	6.52E 06	6.44E 06
3.40E-08	5.83E 06	5.62E 06
3.80E-08	5.15E 06	4.86E 06
4.20E-08	4.54E 06	4.20E 06
4.60E-08	3.98E 06	3.61E 06
5.00E-08	3.48E 06	3.11E 06
5.50E-08	2.95E 06	2.58E 06
6.00E-08	2.50E 06	2.14E 06
6.50E-08	2.11E 06	1.78E 06
7.00E-08	1.80E 06	1.50E 06
8.00E-08	1.31E 06	1.07E 06

NA = 1 NB = 7
T = 1.20E 07 , Z = 1.3E 01

ALPHA-S	7.3E-08		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.056	0.082	0.120
ALPHA-C	2.4E-09	3.0E-09	3.6E-09
ALPHA-D	5.8E-08	1.3E-08	2.7E-09
Y-S	3.1E-04	7.0E-03	1.5E-01

ALPHA	S(ALPHA)		
0.00E 00	1.78E 06	2.78E 06	3.74E 06
2.00E-09	2.56E 06	3.61E 06	4.83E 06
4.00E-09	4.56E 06	5.55E 06	7.12E 06
6.00E-09	6.68E 06	7.44E 06	8.97E 06
7.00E-09	7.48E 06	8.10E 06	9.49E 06
8.00E-09	8.04E 06	8.53E 06	9.75E 06
9.00E-09	8.37E 06	8.75E 06	9.79E 06
1.00E-08	8.52E 06	8.80E 06	9.68E 06
1.10E-08	8.51E 06	8.72E 06	9.47E 06
1.20E-08	8.40E 06	8.55E 06	9.20E 06
1.30E-08	8.21E 06	8.33E 06	8.91E 06
1.40E-08	7.99E 06	8.10E 06	8.63E 06
1.60E-08	7.52E 06	7.63E 06	8.10E 06
1.80E-08	7.07E 06	7.20E 06	7.67E 06
2.00E-08	6.68E 06	6.85E 06	7.30E 06
2.50E-08	5.98E 06	6.19E 06	6.59E 06
3.00E-08	5.53E 06	5.71E 06	5.99E 06
3.50E-08	5.15E 06	5.25E 06	5.39E 06
4.00E-08	4.77E 06	4.80E 06	4.80E 06
5.00E-08	4.01E 06	3.91E 06	3.73E 06
6.00E-08	3.27E 06	3.11E 06	2.84E 06
7.00E-08	2.62E 06	2.44E 06	2.15E 06
8.00E-08	2.08E 06	1.90E 06	1.62E 06
1.00E-07	1.32E 06	1.17E 06	9.58E 05
1.20E-07	8.52E 05	7.46E 05	5.92E 05
1.50E-07	4.63E 05	4.05E 05	3.14E 05
1.70E-07	3.26E 05	2.86E 05	2.19E 05
2.00E-07	1.92E 05	1.72E 05	1.26E 05

NA = 1 NB = 2
T = 5.00E 06 Z = 1.4E 01

ALPHA-S	7.0E-09
NE	1.0E 23
A	0.274
ALPHA-C	5.2E-10
ALPHA-D	4.2E-10
Y-S	7.4E-04

ALPHA	S(ALPHA)
0.00E 00	2.35E 09
5.00E-11	1.78E 09
1.00E-10	1.03E 09
2.00E-10	3.99E 08
3.00E-10	2.09E 08
4.00E-10	1.37E 08
5.00E-10	1.04E 08
6.00E-10	8.73E 07
8.00E-10	7.43E 07
1.00E-09	7.00E 07
1.40E-09	6.38E 07
1.80E-09	5.46E 07
2.00E-09	4.94E 07
2.20E-09	4.42E 07
2.60E-09	3.48E 07
3.00E-09	2.64E 07
3.50E-09	1.88E 07
4.00E-09	1.34E 07
4.50E-09	9.66E 06
5.00E-09	7.06E 06
6.00E-09	3.91E 06
7.00E-09	2.28E 06

NA = 1 NB = 2
T = 1.00E 07 Z = 1.4E 01

ALPHA-S	7.0E-09	
NE	1.0E 23	1.0E 24
A	0.193	0.284
ALPHA-C	4.4E-10	5.3E-10
ALPHA-D	5.9E-10	1.3E-10
Y-S	3.7E-04	5.2E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	3.07E 09	1.91E 09
5.00E-11	1.97E 09	1.58E 09
1.00E-10	9.48E 08	1.05E 09
2.00E-10	3.15E 08	4.57E 08
3.00E-10	1.56E 08	2.49E 08
4.00E-10	9.73E 07	1.63E 08
5.00E-10	7.11E 07	1.23E 08
6.00E-10	5.81E 07	1.01E 08
8.00E-10	4.82E 07	8.29E 07
1.00E-09	4.64E 07	7.57E 07
1.40E-09	4.73E 07	6.63E 07
1.80E-09	4.65E 07	5.55E 07
2.00E-09	4.50E 07	4.97E 07
2.20E-09	4.28E 07	4.41E 07
2.60E-09	3.79E 07	3.42E 07
3.00E-09	3.22E 07	2.56E 07
3.50E-09	2.54E 07	1.81E 07
4.00E-09	1.96E 07	1.28E 07
4.50E-09	1.49E 07	9.18E 06
5.00E-09	1.15E 07	6.71E 06
6.00E-09	6.78E 06	3.76E 06
7.00E-09	4.18E 06	2.22E 06

NA = 1 NB = 2
T = 2.00E 07 Z = 1.4E 01

ALPHA-S	7.0E-09	
NE	1.0E 23	1.0E 24
A	0.137	0.201
ALPHA-C	3.7E-10	4.4E-10
ALPHA-D	8.3E-10	1.8E-10
Y-S	1.8E-04	2.6E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	4.08E 09	2.45E 09
5.00E-11	2.04E 09	1.81E 09
1.00E-10	8.21E 08	1.01E 09
2.00E-10	2.46E 08	3.76E 08
3.00E-10	1.17E 08	1.91E 08
4.00E-10	7.07E 07	1.19E 08
5.00E-10	5.01E 07	8.63E 07
6.00E-10	3.97E 07	6.93E 07
8.00E-10	3.23E 07	5.52E 07
1.00E-09	3.18E 07	5.11E 07
1.40E-09	3.59E 07	4.96E 07
1.80E-09	3.91E 07	4.75E 07
2.00E-09	3.95E 07	4.56E 07
2.20E-09	3.90E 07	4.31E 07
2.60E-09	3.69E 07	3.78E 07
3.00E-09	3.34E 07	3.18E 07
3.50E-09	2.79E 07	2.50E 07
4.00E-09	2.27E 07	1.92E 07
4.50E-09	1.82E 07	1.46E 07
5.00E-09	1.47E 07	1.12E 07
6.00E-09	9.40E 06	6.60E 06
7.00E-09	6.20E 06	4.05E 06

NA = 1 NB = 3
T = 5.00E 06 , Z = 1.4E 01

ALPHA-S	1.1E-08	
NE	1.0E 22	1.0E 23
A	0.186	0.274
ALPHA-C	6.8E-10	8.3E-10
ALPHA-D	1.6E-09	3.5E-10
Y-S	5.5E-04	9.0E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	1.07E 07	2.55E 07
4.00E-10	2.09E 07	4.28E 07
7.00E-10	3.64E 07	6.63E 07
1.00E-09	5.35E 07	8.81E 07
1.50E-09	7.61E 07	1.07E 08
2.00E-09	8.63E 07	1.06E 08
2.50E-09	8.60E 07	9.49E 07
3.00E-09	7.56E 07	8.00E 07
3.50E-09	7.08E 07	6.62E 07
4.00E-09	6.14E 07	5.43E 07
4.50E-09	5.26E 07	4.43E 07
5.00E-09	4.48E 07	3.63E 07
5.50E-09	3.82E 07	2.98E 07
6.00E-09	3.26E 07	2.45E 07
6.50E-09	2.78E 07	2.03E 07
7.00E-09	2.39E 07	1.69E 07
8.00E-09	1.77E 07	1.19E 07
9.00E-09	1.34E 07	8.59E 06
1.00E-08	1.02E 07	6.29E 06
1.20E-08	6.24E 06	3.65E 06
1.40E-08	3.92E 06	2.22E 06
1.70E-08	2.15E 06	1.19E 06
2.00E-08	1.30E 06	7.13E 05
2.25E-08	8.99E 05	5.02E 05
2.50E-08	6.52E 05	3.65E 05

NA = 1 NB = 3
T = 1.00E 07 Z = 1.4E 01

ALPHA-S	1.1E-08	
NE	1.0E 22	1.0E 23
A	0.132	0.195
ALPHA-C	5.8E-10	7.0E-10
ALPHA-D	2.3E-09	5.0E-10
Y-S	2.6E-04	4.5E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	5.45E 06	1.29E 07
4.00E-10	1.12E 07	2.32E 07
7.00E-10	2.12E 07	3.85E 07
1.00E-09	3.44E 07	5.52E 07
1.50E-09	5.66E 07	7.70E 07
2.00E-09	7.12E 07	8.64E 07
2.50E-09	7.63E 07	8.58E 07
3.00E-09	7.47E 07	7.91E 07
3.50E-09	6.97E 07	7.02E 07
4.00E-09	6.27E 07	6.08E 07
4.50E-09	5.55E 07	5.20E 07
5.00E-09	4.87E 07	4.43E 07
5.50E-09	4.27E 07	3.77E 07
6.00E-09	3.73E 07	3.21E 07
6.50E-09	3.26E 07	2.74E 07
7.00E-09	2.85E 07	2.35E 07
8.00E-09	2.19E 07	1.74E 07
9.00E-09	1.70E 07	1.31E 07
1.00E-08	1.34E 07	9.97E 06
1.20E-08	8.56E 06	6.08E 06
1.40E-08	5.59E 06	3.81E 06
1.70E-08	3.20E 06	2.09E 06
2.00E-08	1.97E 06	1.26E 06
2.25E-08	1.36E 06	8.71E 05
2.50E-08	1.00E 06	6.29E 05

NA = 1 NB = 3
T = 2.00E 07 , Z = 1.4E 01

ALPHA-S	1.1E-08	
NE	1.0E 22	1.0E 23
A	0.093	0.137
ALPHA-C	4.8E-10	6.3E-10
ALPHA-D	3.3E-09	7.0E-10
Y-S	1.3E-04	2.1E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	2.98E 06	6.75E 06
4.00E-10	6.20E 06	1.27E 07
7.00E-10	1.29E 07	2.27E 07
1.00E-09	2.34E 07	3.57E 07
1.50E-09	4.38E 07	5.73E 07
2.00E-09	5.96E 07	7.13E 07
2.50E-09	6.73E 07	7.61E 07
3.00E-09	6.89E 07	7.44E 07
3.50E-09	6.69E 07	6.92E 07
4.00E-09	6.19E 07	6.22E 07
4.50E-09	5.65E 07	5.50E 07
5.00E-09	5.09E 07	4.83E 07
5.50E-09	4.55E 07	4.22E 07
6.00E-09	4.05E 07	3.68E 07
6.50E-09	3.60E 07	3.22E 07
7.00E-09	3.20E 07	2.81E 07
8.00E-09	2.52E 07	2.16E 07
9.00E-09	1.99E 07	1.68E 07
1.00E-08	1.60E 07	1.31E 07
1.20E-08	1.05E 07	8.39E 06
1.40E-08	7.06E 06	5.47E 06
1.70E-08	4.17E 06	3.13E 06
2.00E-08	2.58E 06	1.93E 06
2.25E-09	1.78E 06	1.33E 06
2.50E-08	1.33E 06	9.80E 05

NA = 1 NB = 4
T = 5.00E 06 Z = 1.4E 01

ALPHA-S	1.8E-08		
NE	1.0E 21	1.0E 22	1.0E 23
A	0.127	0.186	0.274
ALPHA-C	9.0E-10	1.1E-09	1.3E-09
ALPHA-D	7.2E-09	1.5E-09	3.3E-10
Y-S	2.2E-04	3.8E-03	7.4E-02

ALPHA	S(ALPHA)		
0.00E 00	2.45E 08	1.62E 08	1.33E 08
3.00E-11	2.43E 08	1.61E 08	1.32E 08
7.00E-11	2.35E 08	1.59E 08	1.31E 08
1.00E-10	2.26E 08	1.56E 08	1.30E 08
2.00E-10	1.82E 08	1.42E 08	1.23E 08
4.00E-10	1.03E 08	1.04E 08	1.01E 08
6.00E-10	6.10E 07	7.32E 07	7.90E 07
8.00E-10	4.00E 07	5.34E 07	6.30E 07
1.00E-09	2.89E 07	4.13E 07	5.22E 07
2.00E-09	1.60E 07	2.46E 07	3.68E 07
4.00E-09	2.18E 07	2.82E 07	3.83E 07
6.00E-09	2.51E 07	2.84E 07	3.21E 07
8.00E-09	2.35E 07	2.42E 07	2.32E 07
1.00E-08	1.98E 07	1.90E 07	1.60E 07
1.20E-08	1.57E 07	1.42E 07	1.09E 07
1.40E-08	1.23E 07	1.06E 07	7.47E 06
1.60E-08	9.53E 06	7.79E 06	5.17E 06
1.80E-08	7.37E 06	5.78E 06	3.66E 06
2.00E-08	5.78E 06	4.38E 06	2.66E 06
2.25E-08	4.26E 06	3.12E 06	1.82E 06
2.50E-08	3.25E 06	2.31E 06	1.30E 06
2.75E-08	2.48E 06	1.73E 06	9.42E 05
3.00E-08	1.94E 06	1.33E 06	7.11E 05
3.50E-08	1.22E 06	8.28E 05	4.27E 05
4.00E-08	8.29E 05	5.57E 05	2.81E 05

NA = 1 NB = 4
T = 1.00E 07 Z = 1.4E 01

ALPHA-S	1.8E-08		
NE	1.0E 21	1.0E 22	1.0E 23
A	0.090	0.132	0.193
ALPHA-C	7.6E-10	9.2E-10	1.1E-09
ALPHA-D	1.0E-08	2.2E-09	4.7E-10
Y-S	1.1E-04	1.9E-03	3.7E-02

ALPHA	S(ALPHA)		
0.00E 00	3.23E 08	2.05E 08	1.54E 08
3.00E-11	3.19E 08	2.04E 08	1.54E 08
7.00E-11	3.01E 08	1.99E 08	1.52E 08
1.00E-10	2.80E 08	1.93E 08	1.50E 08
2.00E-10	2.00E 08	1.65E 08	1.37E 08
4.00E-10	9.42E 07	1.05E 08	1.03E 08
6.00E-10	5.08E 07	6.65E 07	7.40E 07
8.00E-10	3.17E 07	4.51E 07	5.48E 07
1.00E-09	2.22E 07	3.31E 07	4.27E 07
2.00E-09	1.16E 07	1.76E 07	2.57E 07
4.00E-09	1.77E 07	2.22E 07	2.89E 07
6.00E-09	2.23E 07	2.52E 07	2.87E 07
8.00E-09	2.22E 07	2.34E 07	2.42E 07
1.00E-08	1.97E 07	1.97E 07	1.88E 07
1.20E-08	1.65E 07	1.56E 07	1.40E 07
1.40E-08	1.34E 07	1.22E 07	1.03E 07
1.60E-08	1.08E 07	9.41E 06	7.57E 06
1.80E-08	8.60E 06	7.27E 06	5.58E 06
2.00E-08	6.90E 06	5.69E 06	4.20E 06
2.25E-08	5.19E 06	4.19E 06	2.98E 06
2.50E-08	4.03E 06	3.19E 06	2.19E 06
2.75E-08	3.11E 06	2.44E 06	1.62E 06
3.00E-08	2.46E 06	1.91E 06	1.25E 06
3.50E-08	1.54E 06	1.20E 06	7.66E 05
4.00E-08	1.05E 06	8.13E 05	5.11E 05

NA = 1 NB = 4
T = 2.00E 07 Z = 1.4E 01

ALPHA-S	1.8E-08		
NE	1.0E 21	1.0E 22	1.0E 23
A	0.064	0.093	0.137
ALPHA-C	7.0E-10	7.7E-10	9.4E-10
ALPHA-D	1.4E-08	3.1E-09	6.7E-10
Y-S	5.5E-05	9.6E-04	1.8E-02
0.00E 00	4.29E 08	2.65E 08	1.88E 08
3.00E-11	4.19E 08	2.62E 08	1.87E 08
7.00E-11	3.79E 08	2.52E 08	1.83E 08
1.00E-10	3.38E 08	2.40E 08	1.79E 08
2.00E-10	2.06E 08	1.88E 08	1.56E 08
4.00E-10	8.11E 07	1.01E 08	1.05E 08
6.00E-10	4.08E 07	5.79E 07	6.87E 07
8.00E-10	2.46E 07	3.70E 07	4.75E 07
1.00E-09	1.69E 07	2.61E 07	3.52E 07
2.00E-09	8.68E 06	1.29E 07	1.86E 07
4.00E-09	1.48E 07	1.80E 07	2.27E 07
6.00E-09	1.99E 07	2.24E 07	2.55E 07
8.00E-09	2.10E 07	2.22E 07	2.35E 07
1.00E-08	1.95E 07	1.97E 07	1.96E 07
1.20E-08	1.70E 07	1.64E 07	1.55E 07
1.40E-08	1.42E 07	1.33E 07	1.20E 07
1.60E-08	1.18E 07	1.07E 07	9.27E 06
1.80E-08	9.60E 06	8.49E 06	7.13E 06
2.00E-08	7.81E 06	6.81E 06	5.56E 06
2.25E-08	5.94E 06	5.13E 06	4.09E 06
2.50E-08	4.66E 06	3.97E 06	3.10E 06
2.75E-08	3.62E 06	3.08E 06	2.36E 06
3.00E-08	2.87E 06	2.43E 06	1.84E 06
3.50E-08	1.80E 06	1.53E 06	1.15E 06
4.00E-08	1.23E 06	1.04E 06	7.78E 05

NA = 1 NB = 5
T = 5.00E 06 Z = 1.4E 01

ALPHA-S	2.7E-08		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.087	0.127	0.186
ALPHA-C	1.1E-09	1.4E-09	1.6E-09
ALPHA-D	3.3E-08	7.0E-09	1.5E-09
Y-S	6.0E-05	1.0E-03	2.0E-02

ALPHA	----------	S(ALPHA)	--------
0.00E 00	3.53E 06	7.02E 06	1.26E 07
1.00E-10	3.56E 06	7.07E 06	1.27E 07
2.00E-10	3.66E 06	7.21E 06	1.29E 07
4.00E-10	4.03E 06	7.74E 06	1.38E 07
7.00E-10	5.07E 06	9.13E 06	1.54E 07
1.00E-09	6.71E 06	1.11E 07	1.78E 07
2.00E-09	1.53E 07	1.58E 07	2.65E 07
3.00E-09	2.30E 07	2.65E 07	3.16E 07
4.00E-09	2.63E 07	2.87E 07	3.20E 07
5.00E-09	2.63E 07	2.79E 07	3.00E 07
6.00E-09	2.50E 07	2.58E 07	2.73E 07
7.00E-09	2.32E 07	2.36E 07	2.46E 07
8.00E-09	2.14E 07	2.16E 07	2.22E 07
9.00E-09	1.98E 07	1.99E 07	2.02E 07
1.00E-08	1.83E 07	1.84E 07	1.85E 07
1.10E-08	1.70E 07	1.71E 07	1.70E 07
1.20E-08	1.59E 07	1.59E 07	1.57E 07
1.30E-08	1.49E 07	1.48E 07	1.44E 07
1.40E-08	1.40E 07	1.38E 07	1.33E 07
1.60E-08	1.23E 07	1.20E 07	1.12E 07
1.80E-08	1.08E 07	1.03E 07	9.39E 06
2.00E-08	9.45E 06	8.83E 06	7.81E 06
2.20E-08	8.21E 06	7.53E 06	6.48E 06
2.40E-08	7.17E 06	6.43E 06	5.38E 06
2.60E-08	6.22E 06	5.48E 06	4.46E 06
2.80E-08	5.42E 06	4.68E 06	3.70E 06
3.00E-08	4.71E 06	4.00E 06	3.09E 06
3.40E-08	3.60E 06	2.97E 06	2.19E 06
3.80E-08	2.77E 06	2.22E 06	1.57E 06
4.20E-08	2.14E 06	1.69E 06	1.16E 06
4.60E-08	1.67E 06	1.31E 06	8.83E 05
5.00E-08	1.32E 06	1.04E 06	7.04E 05
5.50E-08	9.68E 05	7.75E 05	5.23E 05
6.00E-08	7.49E 05	6.01E 05	4.02E 05
6.50E-08	5.95E 05	4.76E 05	3.15E 05
7.00E-08	4.73E 05	3.80E 05	2.50E 05
8.00E-08	3.19E 05	2.56E 05	1.68E 05

NA = 1 NB = 5
T = 1.00E 07 Z = 1.4E 01

ALPHA-S	2.7E-08		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.061	0.090	0.132
ALPHA-C	9.3E-10	1.1E-09	1.4E-09
ALPHA-D	4.6E-08	9.9E-09	2.1E-09
Y-S	2.9E-05	5.2E-04	1.0E-02

ALPHA	S(ALPHA)		
0.00E 00	2.21E 06	4.31E 06	7.75E 06
1.00E-10	2.24E 06	4.34E 06	7.80E 06
2.00E-10	2.30E 06	4.44E 06	7.94E 06
4.00E-10	2.56E 06	4.82E 06	8.47E 06
7.00E-10	3.22E 06	5.86E 06	9.84E 06
1.00E-09	4.62E 06	7.46E 06	1.18E 07
2.00E-09	1.23E 07	1.55E 07	2.02E 07
3.00E-09	2.00E 07	2.28E 07	2.66E 07
4.00E-09	2.40E 07	2.60E 07	2.87E 07
5.00E-09	2.49E 07	2.61E 07	2.79E 07
6.00E-09	2.42E 07	2.48E 07	2.58E 07
7.00E-09	2.28E 07	2.30E 07	2.36E 07
8.00E-09	2.13E 07	2.13E 07	2.16E 07
9.00E-09	1.97E 07	1.97E 07	1.98E 07
1.00E-08	1.82E 07	1.82E 07	1.83E 07
1.10E-08	1.69E 07	1.70E 07	1.70E 07
1.20E-08	1.58E 07	1.59E 07	1.59E 07
1.30E-08	1.47E 07	1.48E 07	1.48E 07
1.40E-08	1.39E 07	1.39E 07	1.38E 07
1.60E-08	1.24E 07	1.22E 07	1.19E 07
1.80E-08	1.11E 07	1.07E 07	1.02E 07
2.00E-08	9.81E 06	9.38E 06	8.76E 06
2.20E-08	8.66E 06	8.15E 06	7.45E 06
2.40E-08	7.68E 06	7.11E 06	6.36E 06
2.60E-08	6.74E 06	6.17E 06	5.40E 06
2.80E-08	5.97E 06	5.37E 06	4.60E 06
3.00E-08	5.24E 06	4.67E 06	3.93E 06
3.40E-08	4.09E 06	3.56E 06	2.90E 06
3.80E-08	3.19E 06	2.73E 06	2.16E 06
4.20E-08	2.49E 06	2.11E 06	1.64E 06
4.60E-08	1.95E 06	1.65E 06	1.27E 06
5.00E-08	1.53E 06	1.30E 06	1.00E 06
5.50E-08	1.11E 06	9.62E 05	7.47E 05
6.00E-08	8.56E 05	7.46E 05	5.77E 05
6.50E-08	6.62E 05	5.92E 05	4.56E 05
7.00E-08	5.41E 05	4.71E 05	3.62E 05
8.00E-08	3.63E 05	3.18E 05	2.43E 05

NA = 1 NB = 5
T = 2.00E 07 Z = 1.4E 01

ALPHA-S	2.7E-08		
NE	1.0E 20	1.0E 21	1.0E 22
A	0.043	0.064	0.093
ALPHA-C	7.9E-10	9.5E-10	1.2E-09
ALPHA-D	6.5E-08	1.4E-08	3.0E-09
Y-S	1.5E-05	2.7E-04	5.0E-03

ALPHA	----------	S(ALPHA)	--------
0.00E 00	1.47E 06	2.76E 06	4.89E 06
1.00E-10	1.49E 06	2.78E 06	4.93E 06
2.00E-10	1.54E 06	2.85E 06	5.03E 06
4.00E-10	1.73E 06	3.12E 06	5.41E 06
7.00E-10	2.33E 06	3.90E 06	6.46E 06
1.00E-09	3.41E 06	5.19E 06	8.03E 06
2.00E-09	1.03E 07	1.26E 07	1.59E 07
3.00E-09	1.77E 07	1.99E 07	2.29E 07
4.00E-09	2.21E 07	2.38E 07	2.59E 07
5.00E-09	2.37E 07	2.47E 07	2.60E 07.
6.00E-09	2.36E 07	2.40E 07	2.47E 07
7.00E-09	2.26E 07	2.26E 07	2.29E 07
8.00E-09	2.12E 07	2.11E 07	2.12E 07
9.00E-09	1.96E 07	1.96E 07	1.96E 07
1.00E-08	1.82E 07	1.81E 07	1.82E 07
1.10E-08	1.68E 07	1.69E 07	1.69E 07
1.20E-08	1.57E 07	1.58E 07	1.58E 07
1.30E-08	1.45E 07	1.47E 07	1.48E 07
1.40E-08	1.38E 07	1.39E 07	1.39E 07
1.60E-08	1.24E 07	1.23E 07	1.22E 07
1.80E-08	1.12E 07	1.10E 07	1.07E 07
2.00E-08	1.01E 07	9.75E 06	9.33E 06
2.20E-08	9.17E 06	8.60E 06	8.10E 06
2.40E-08	8.03E 06	7.62E 06	7.05E 06
2.60E-08	7.10E 06	6.70E 06	6.11E 06
2.80E-08	6.36E 06	5.92E 06	5.31E 06
3.00E-08	5.61E 06	5.20E 06	4.61E 06
3.40E-08	4.46E 06	4.05E 06	3.51E 06
3.80E-08	3.52E 06	3.16E 06	2.69E 06
4.20E-08	2.76E 06	2.46E 06	2.07E 06
4.60E-08	2.18E 06	1.93E 06	1.62E 06
5.00E-08	1.70E 06	1.51E 06	1.27E 06
5.50E-08	1.21E 06	1.11E 06	9.44E 05
6.00E-08	9.30E 05	8.59E 05	7.31E 05
6.50E-08	7.45E 05	6.83E 05	5.79E 05
7.00E-08	5.91E 05	5.43E 05	4.60E 05
8.00E-08	3.95E 05	3.65E 05	3.09E 05

NA = 1 NB = 5
T = 2.00E 07 Z = 1.4E 01

ALPHA-S	3.8E-08	
NE	1.0E 20	1.0E 21
A	0.043	0.064
ALPHA-C	1.1E-09	1.3E-09
ALPHA-D	6.4E-08	1.4E-08
Y-S	5.3E-05	1.0E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	1.23E 08	7.90E 07
1.00E-10	1.17E 08	7.73E 07
2.00E-10	1.02E 08	7.27E 07
4.00E-10	6.66E 07	5.88E 07
7.00E-10	3.44E 07	3.87E 07
1.00E-09	1.99E 07	2.56E 07
2.00E-09	6.56E 06	9.65E 06
3.00E-09	4.45E 06	6.41E 06
4.00E-09	4.60E 06	6.15E 06
5.00E-09	5.50E 06	6.90E 06
6.00E-09	6.60E 06	7.93E 06
7.00E-09	7.68E 06	8.94E 06
8.00E-09	8.60E 06	9.79E 06
9.00E-09	9.38E 06	1.05E 07
1.00E-08	9.87E 06	1.09E 07
1.10E-08	1.04E 07	1.12E 07
1.20E-08	1.06E 07	1.13E 07
1.30E-08	1.09E 07	1.14E 07
1.40E-08	1.08E 07	1.13E 07
1.60E-08	1.06E 07	1.09E 07
1.80E-08	1.02E 07	1.04E 07
2.00E-08	9.69E 06	9.73E 06
2.20E-08	9.14E 06	9.06E 06
2.40E-08	8.52E 06	8.37E 06
2.60E-08	7.92E 06	7.70E 06
2.80E-08	7.29E 06	7.06E 06
3.00E-08	6.78E 06	6.48E 06
3.40E-08	5.73E 06	5.41E 06
3.80E-08	4.81E 06	4.52E 06
4.20E-08	4.08E 06	3.77E 06
4.60E-08	3.45E 06	3.15E 06
5.00E-08	2.93E 06	2.65E 06
5.50E-08	2.33E 06	2.12E 06
6.00E-08	1.90E 06	1.71E 06
6.50E-08	1.54E 06	1.39E 06
7.00E-08	1.29E 06	1.15E 06
8.00E-08	8.31E 05	7.65E 05

NA = 1 NB = 7
T = 2.00E 07 Z = 1.4E 01

ALPHA-S	5.0E-08	
NE	1.0E 20	1.0E 21
A	0.043	0.064
ALPHA-C	1.5E-09	1.8E-09
ALPHA-D	6.4E-08	1.4E-08
Y-S	1.6E-04	3.3E-03

ALPHA	--- S(ALPHA) ---	
0.00E 00	1.81E 06	2.93E 06
2.00E-09	4.00E 06	5.23E 06
4.00E-09	8.80E 06	9.76E 06
6.00E-09	1.15E 07	1.20E 07
7.00E-09	1.19E 07	1.22E 07
8.00E-09	1.19E 07	1.21E 07
9.00E-09	1.17E 07	1.18E 07
1.00E-08	1.14E 07	1.14E 07
1.10E-08	1.09E 07	1.10E 07
1.20E-08	1.05E 07	1.06E 07
1.30E-08	1.00E 07	1.02E 07
1.40E-08	9.65E 06	9.82E 06
1.60E-08	8.59E 06	9.22E 06
1.80E-08	8.42E 06	8.70E 06
2.00E-08	8.03E 06	8.29E 06
2.50E-08	7.22E 06	7.36E 06
3.00E-08	6.47E 06	6.48E 06
3.50E-08	5.74E 06	5.64E 06
4.00E-08	5.02E 06	4.84E 06
5.00E-08	3.74E 06	3.50E 06
6.00E-08	2.74E 06	2.52E 06
7.00E-08	1.96E 06	1.79E 06
8.00E-08	1.46E 06	1.32E 06
1.00E-07	8.00E 05	7.25E 05
1.20E-07	5.07E 05	4.44E 05
1.50E-07	2.38E 05	2.16E 05
1.70E-07	1.52E 05	1.39E 05
2.00E-07	9.06E 04	8.25E 04

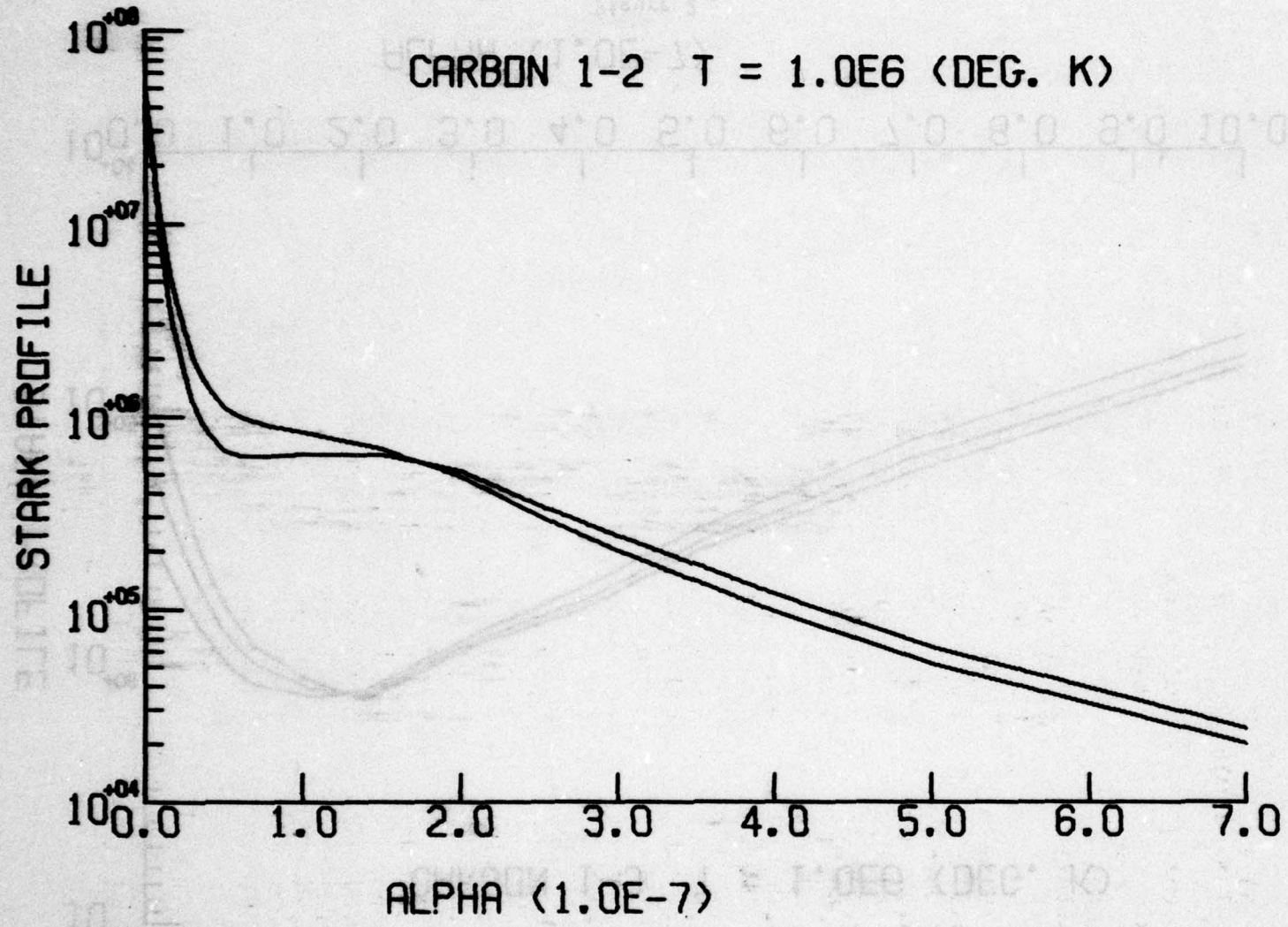
CARBON 1-2 T = 1.0E6 (DEG. K)
STARK PROFILE
10+08
10+07
10+06
10+05
10+04
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
ALPHA (1.0E-7)

Figure 1

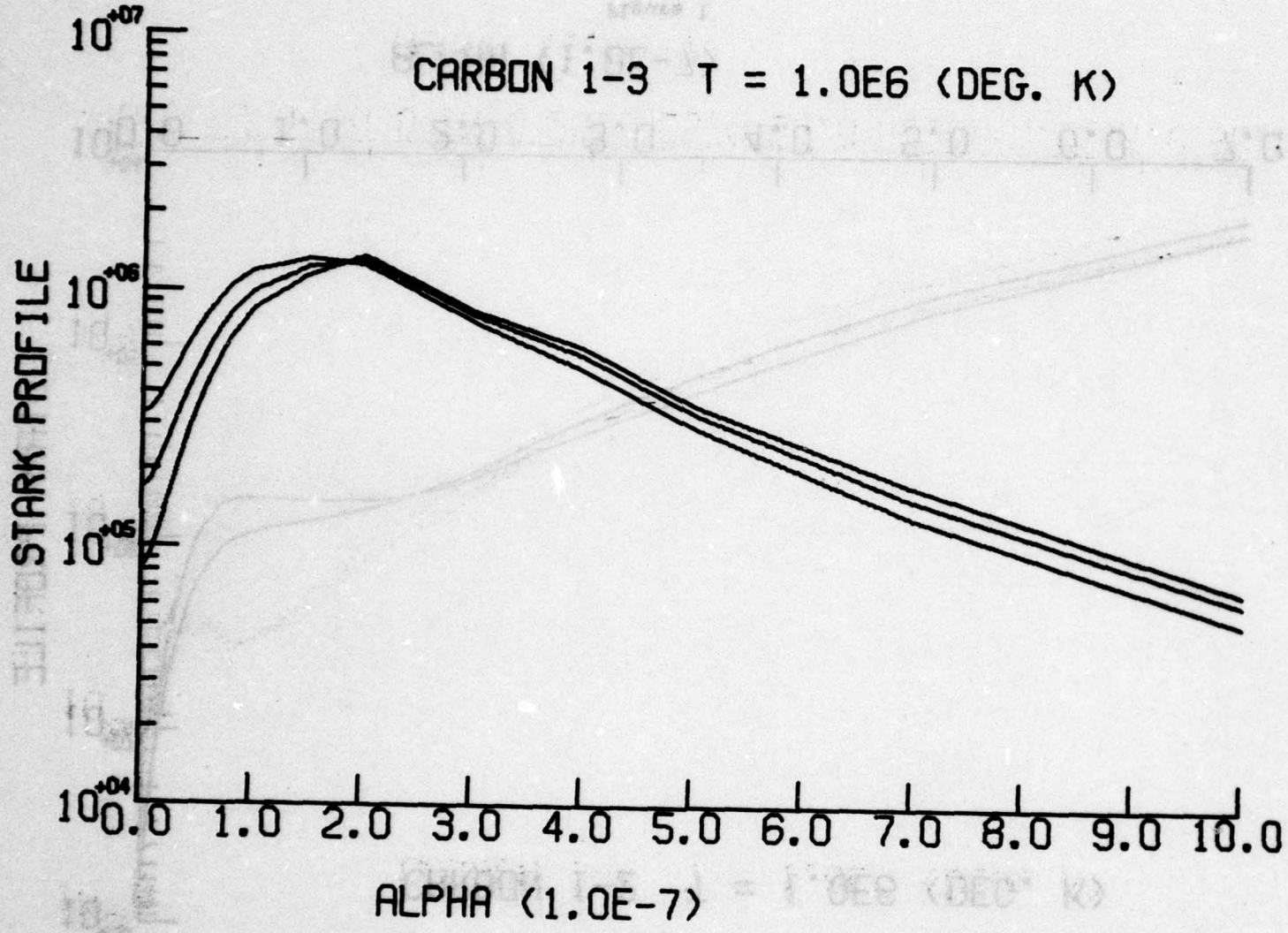
CARBON 1-3 T = 1.0E6 (DEG. K)
STARK PROFILE
10+07
10+06
10+05
10+04
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0
ALPHA (1.0E-7)

Figure 2

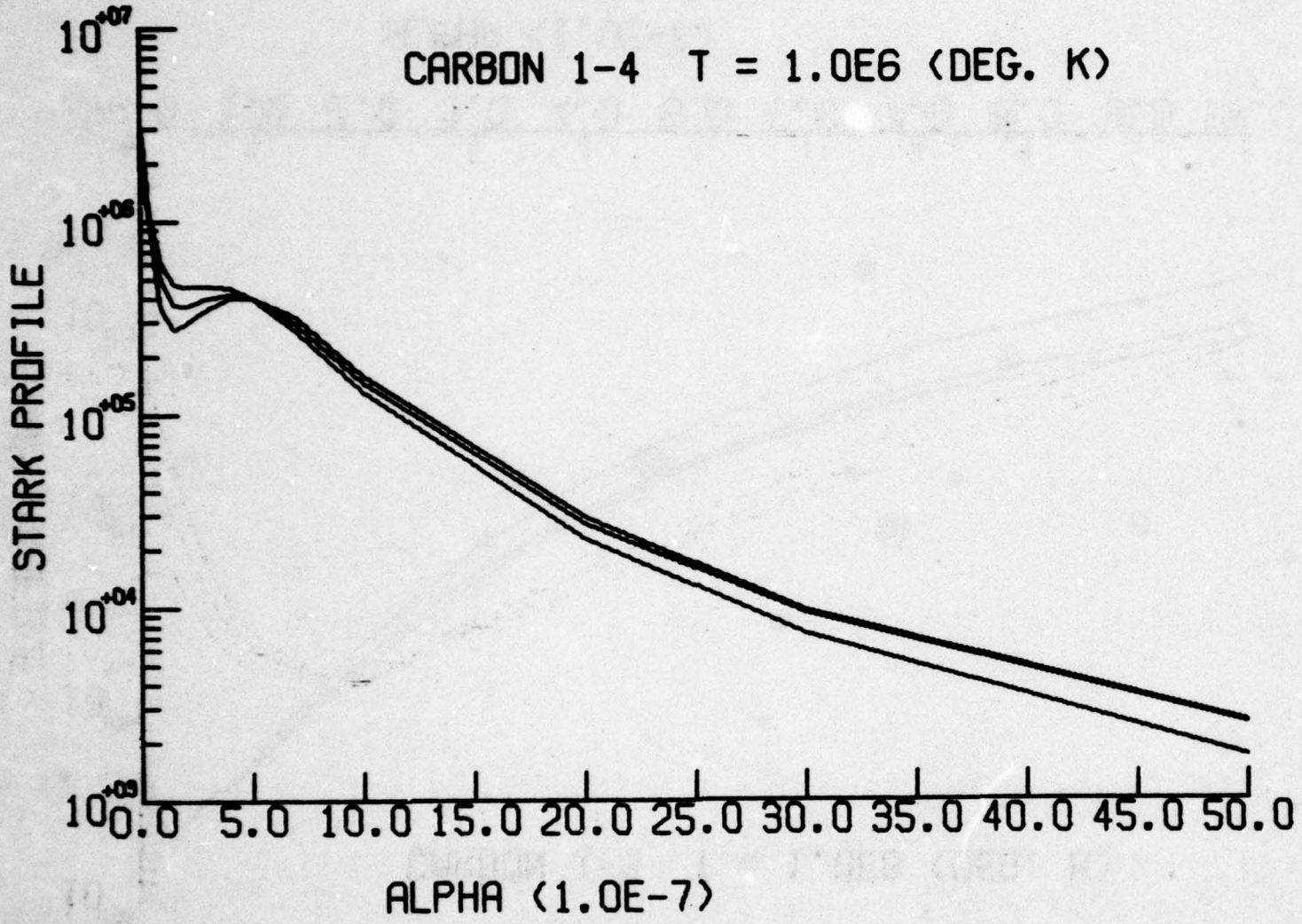
CARBON 1-4 T = 1.0E6 (DEG. K)
STARK PROFILE
10+07
10+06
10+05
10+04
10+03
0.0 5.0 10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0
ALPHA (1.0E-7)

Figure 3

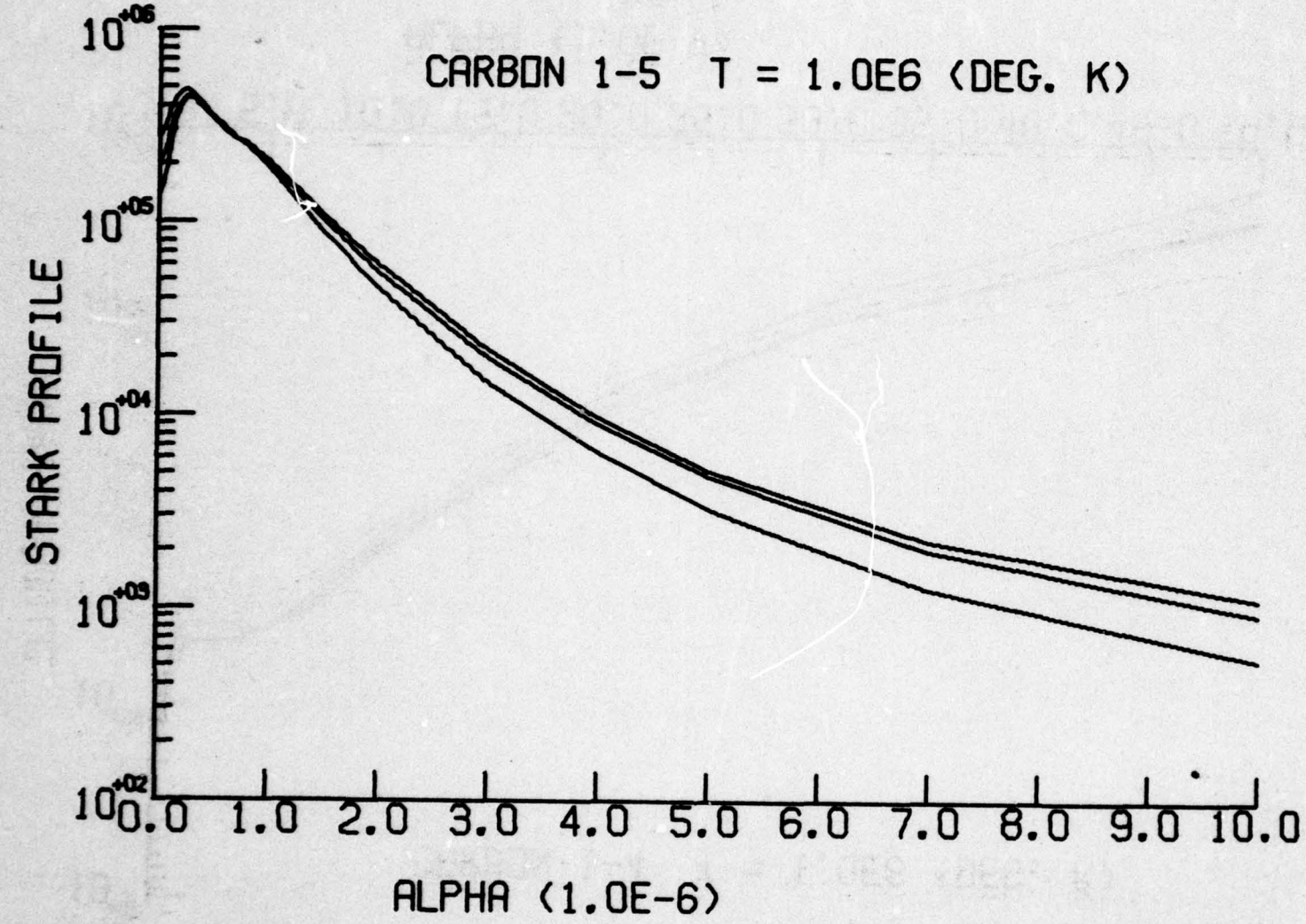
CARBON 1-5 T = 1.0E6 (DEG. K)
STARK PROFILE
10+06
10+05
10+04
10+03
10+02
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
ALPHA (1.0E-6)

Figure 4

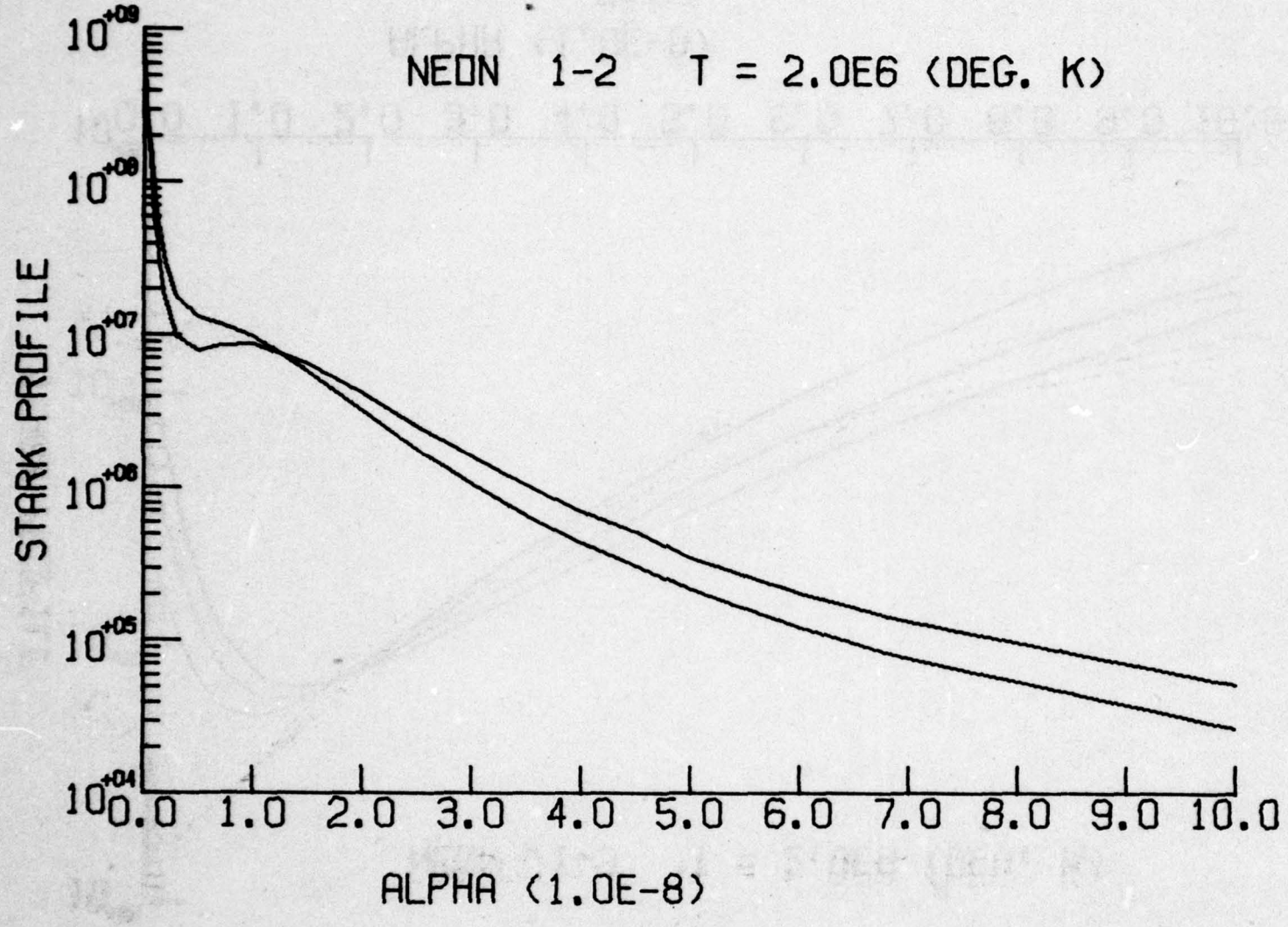
NEON 1-2 T = 2.0E6 (DEG. K)
STARK PROFILE
10+09
10+08
10+07
10+06
10+05
10+04
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0
ALPHA (1.0E-8)

Figure 5

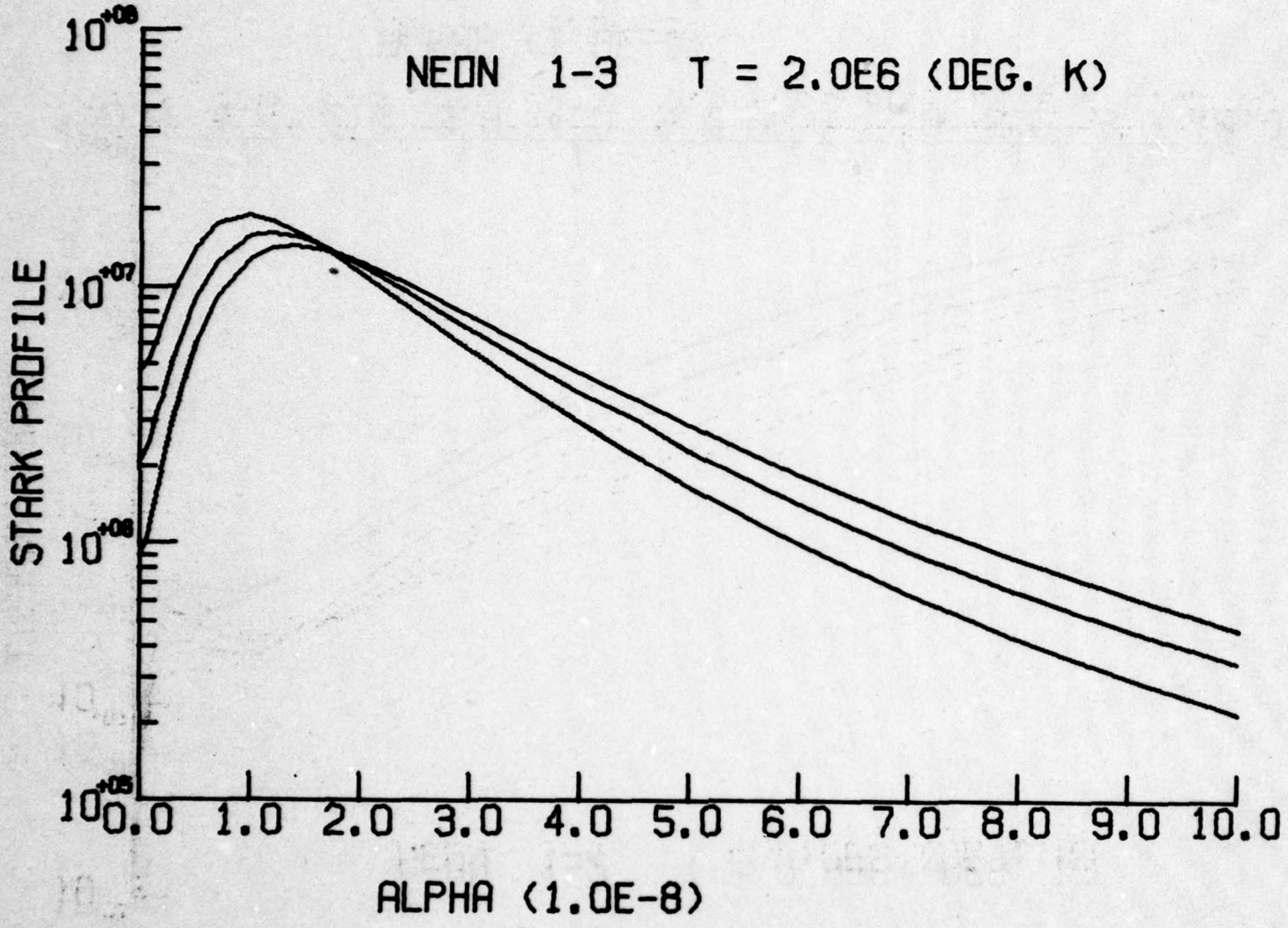
NEON 1-3 T = 2.0E6 (DEG. K)
STARK PROFILE
10+08
10+07
10+06
10+05
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
ALPHA (1.0E-8)

Figure 6

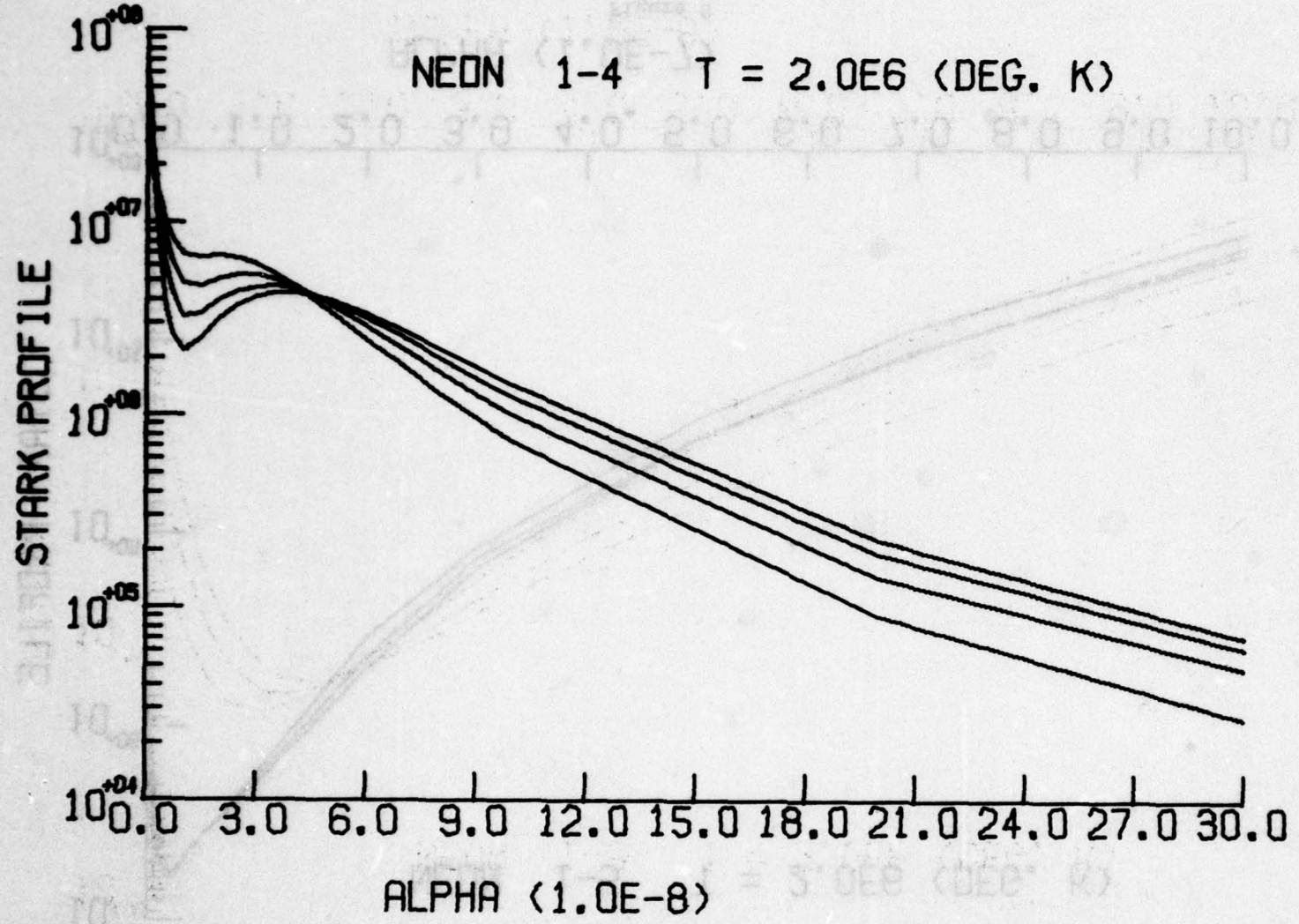
NEON 1-4 T = 2.0E6 (DEG. K)
STARK PROFILE
10+08
10+07
10+06
10+05
10+04
0.0 3.0 6.0 9.0 12.0 15.0 18.0 21.0 24.0 27.0 30.0
ALPHA (1.0E-8)

Figure 7

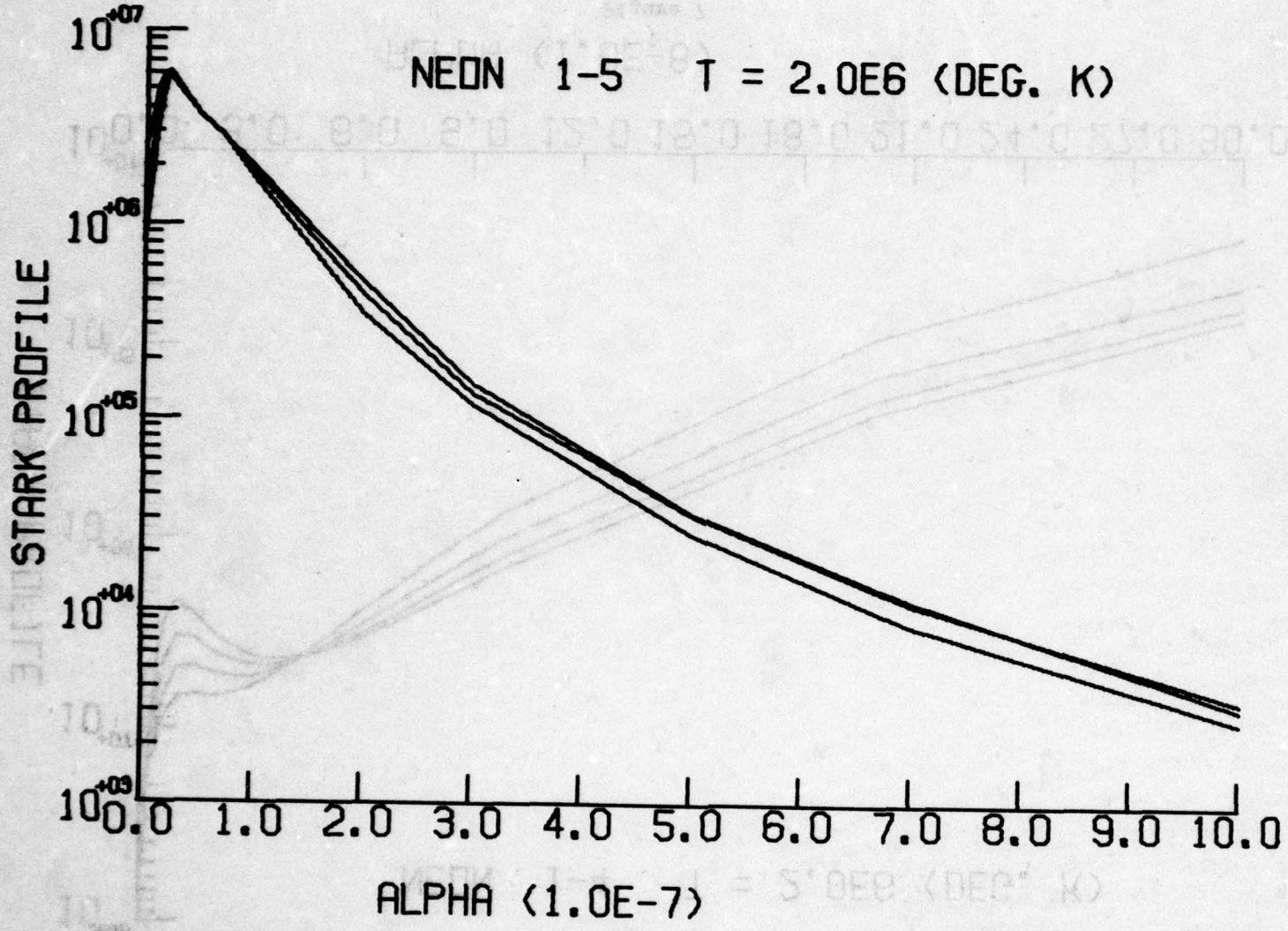
NEON 1-5 T = 2.0E6 (DEG. K)
STARK PROFILE
10+07
10+06
10+05
10+04
10+03
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0
ALPHA (1.0E-7)

Figure 8

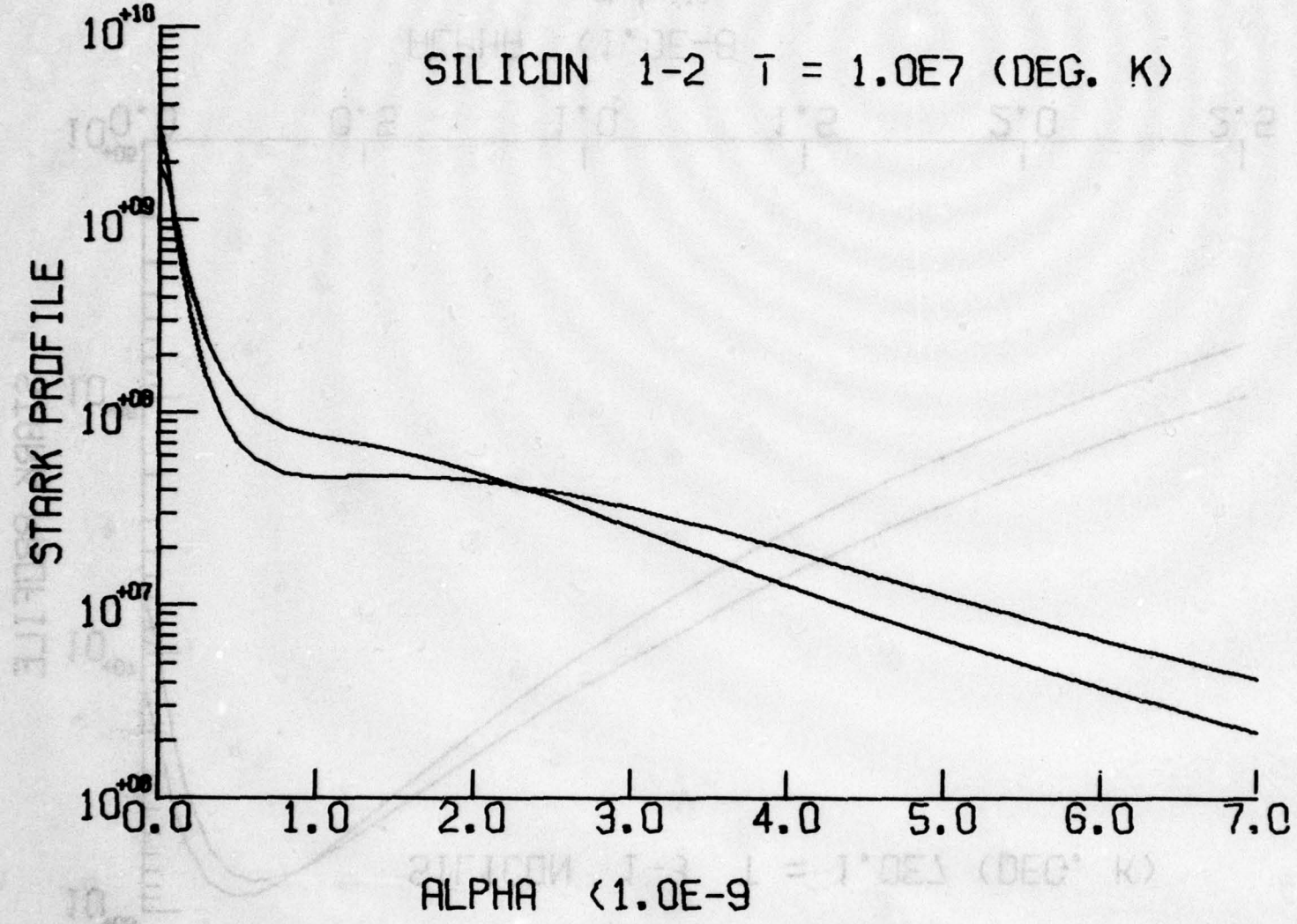
SILICON 1-2 T = 1.0E7 (DEG. K)
STARK PROFILE
10+10
10+09
10+08
10+07
10+06
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
ALPHA (1.0E-9

Figure 9

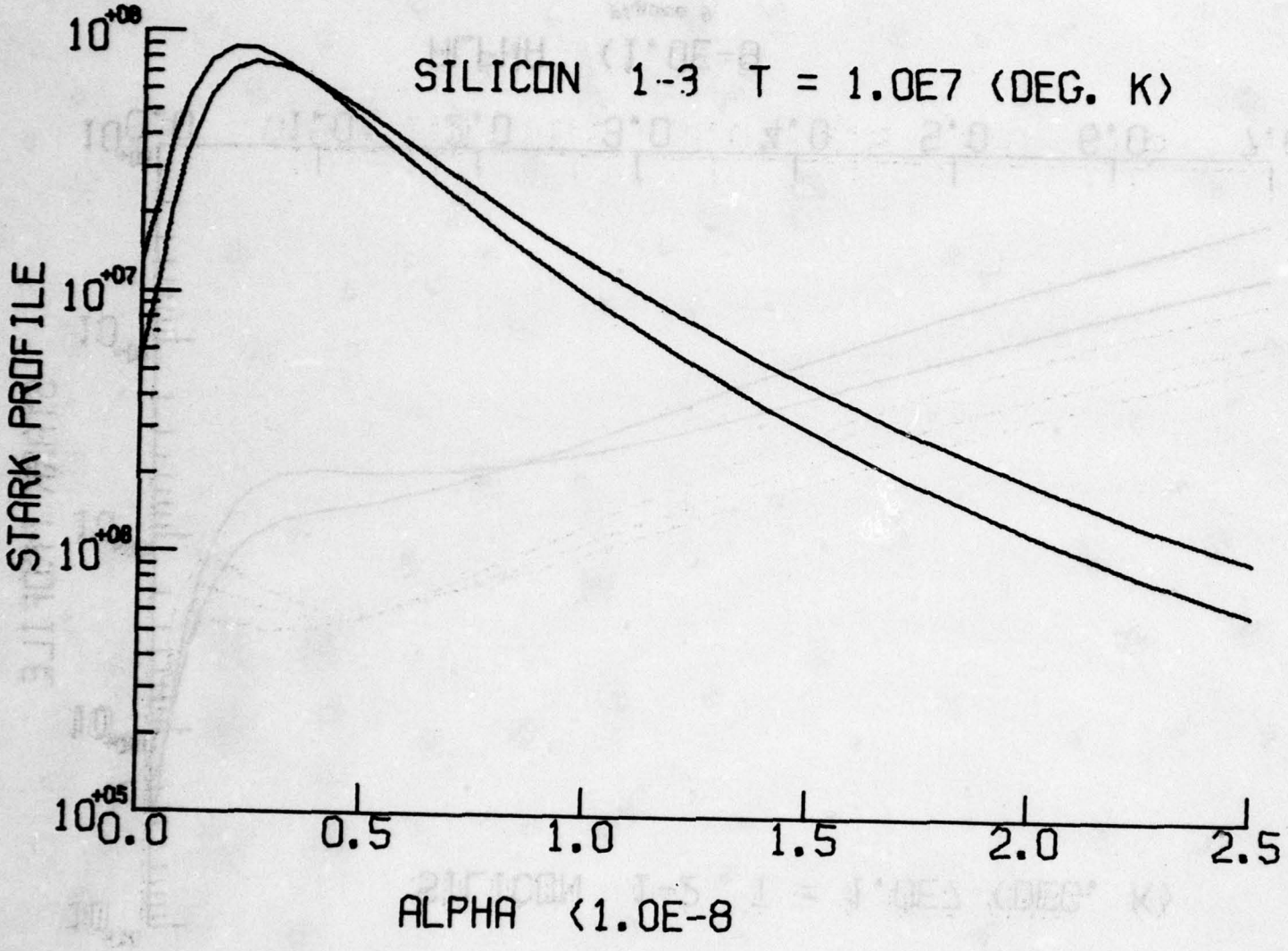
SILICON 1-3 T = 1.0E7 (DEG. K)
STARK PROFILE
10+08
10+07
10+06
10+05
0.0
0.5
1.0
1.5
2.0
2.5
ALPHA (1.0E-8

Figure 10

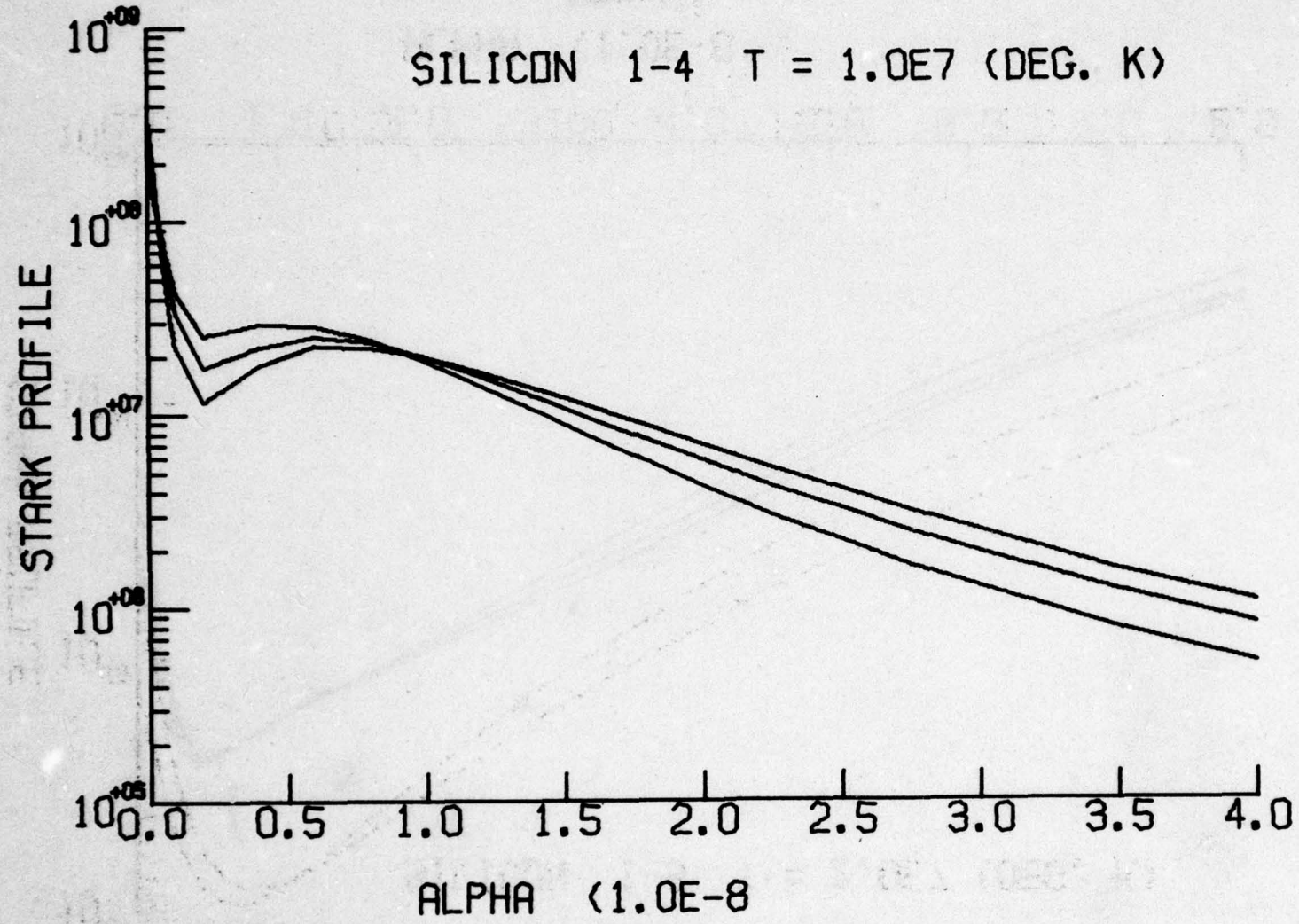
SILICON 1-4 T = 1.0E7 (DEG. K)
STARK PROFILE
10+09
10+08
10+07
10+06
10+05
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
ALPHA (1.0E-8

Figure 11

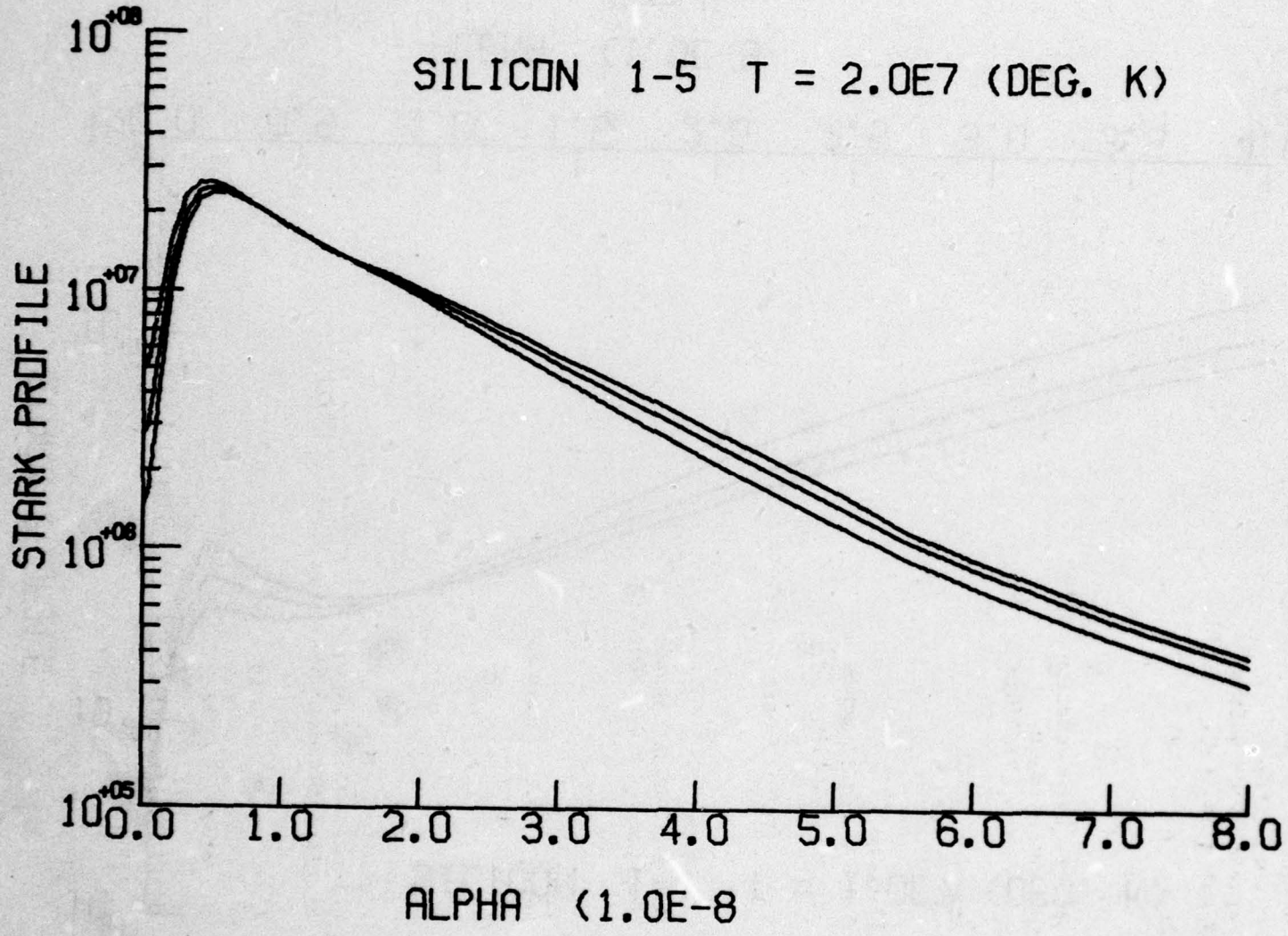
SILICON 1-5 T = 2.0E7 (DEG. K)
STARK PROFILE
10+08
10+07
10+06
10+05
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
ALPHA (1.0E-8

Figure 12

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