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DEEXCITATION OF IONIZED ATOMS.(U)
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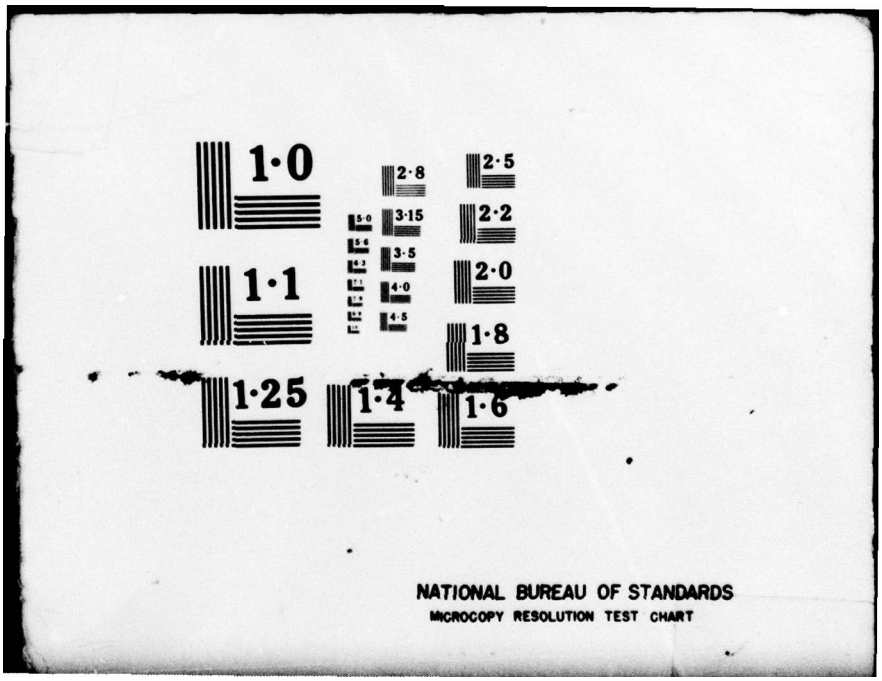
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1. Papers

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18. K-Shell Auger Rates for Multiply-Ionized Atoms I: Neon, J. Electron Spectr. 7, 287 (1975).

19. Theoretical Fluorescence Yields for Neon, Phys. Rev. A 12, 122 (1975).

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23. Relative Multiple Ionization Cross Sections of Neon by Different Projectiles, in Beam-Foil Spectroscopy, ed. I. Sellin and D. Pegg, Plenum Press (1976), p. 629.

24. Theoretical X-ray Spectra for Double Vacancy in 2p Shell of Argon, Int. Conf. on the Physics of X-ray Spectra. ed. R. D. Deslattes, 1976, p. 344.

25. Fluorescence Yields for Multiply-Ionized, Ions, 'Applications of Small Accelerators', IEEE Proc. 414 (1977).

2. Technical Report

1. Applications of Auger Electron Spectroscopy,

C.P. Bhalla and A. Schmiedekamp, August, 1976.

3. Students Degrees Awarded

(a) D.L. Walters obtained Ph.D. degree

(b) M. Hein obtained M.S. degree

4. Brief Outline of Research Findings

Extensive calculations of the Auger rates, x-ray rates and fluorescence yields for single vacancy in 1s shell, 2p shell, 3p shell and 3d shell were completed.

Theoretical expressions for the Auger rates of various spectroscopic terms, designated by quantum numbers α L S, were derived for single and double K-vacancy configurations of neon-like atoms. Calculations of the Auger rates, x-ray rates and multiplet fluorescence yields were completed for neon and nitrogen. The x-ray transition energies were also calculated. The significance of the present calculations is that an atom with a double K-shell vacancy populates nonstatistically the final states with a single K-shell vacancy. Some of these final states are metastable and have nanosecond lifetimes. Therefore, it may be feasible, at least in principle, that one can produce large numbers of atoms (in such metastable states with a single K-vacancy) which result from the decay of double K-shell vacancy states. More comprehensive work both theoretical and experimental involving ion-atom collisions would be required to establish the feasibility of x-ray lasers along the lines suggested here.

A technical report entitled "Applications of Auger Spectroscopy", contains a description of the various application and references.