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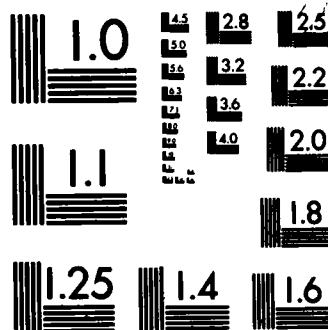
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21. ABSTRACT (Continue on reverse side if necessary and identify by block number) Several scaling and starting laws for rotationally inelastic(RI) collisions have been developed and applied. These laws will provide a compact description of collisional processes for use in technological applications.		

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FINAL REPORT

Study of Excited State Energy Transfer Processes

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We have completed and published a comprehensive review⁽¹⁾ of the theory and application of the several scaling and fitting laws for Rotationally Inelastic (RI) collisions which we developed under AFOSR support. The review will serve as a guide for allowing broader application of this approach by other members in the field.

We have shown⁽²⁾ that a classical limit impulsive calculation can allow analytic evaluation of the RI basis rate constant $k_{l \rightarrow 0}$ which predicts the power-law dependence $k_{l \rightarrow 0} = [l(l+1)]^{-\gamma}$. This provides simple theoretical support for this previously observed empirical observation which has been shown⁽¹⁾ to give good agreement with experimental and theoretical results in a large variety of RI collision systems.

We have completed measurements and preliminary analysis⁽³⁾ of the relative velocity dependence of RI cross-sections in $\text{Li}_2^*(A'\Sigma)-\text{Xe}$. These cross-sections show an unusually strong dependence on velocity. Calculations using classical trajectory methods are presently underway to predict the experimental results, and thus gain information on the previously unknown Li_2^*-Xe interaction potential.

1. T.A. Brunner and D.E. Pritchard, Dynamics of the Excited State, ed. by K.P. Lawley, John Wiley and Sons, 1982.
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