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Alignment Effects in the Fully Quantum State Resolved Inelastic NO(X) + Rare Gas Collisions BALAZS HORNUNG, MARK BROUARD, HELEN CHADWICK, CHRIS J. EYLES, BETHAN NICHOLS, MICHAEL SCOTT, Department of Chemistry, University of Oxford, UK, JAVIER AOIZ, PABLO G. JAMBRINA, Depramento de Quimica Fisica, Universidad Complutense, Spain, MARCELLO DE MIRANDA, School of Chemsitry, University of Leeds, UK, STEVEN STOLTE, Insitute of Atomic and Molecular Physics, Jilin University China — The rotational alignment effects in the rotationally inelastic scattering of NO($X^2\Pi_{1/2}$) with Ar and Kr have been investigated by means of quantum mechanical, quasi-classical trajectory, and Monte Carlo scattering calculations. It has been shown that the repulsive nature of the interaction potential at a collision energy of 65meV is primarily responsible for the rotational alignment. On the other hand, the alternating trend in the integrated quantum mechanical parity resolved alignment moments as a function of the final rotational state reflects differences in the differential cross sections for the total NO(X) parity conserving and changing collisions due to quantum interferences, rather than a difference in stereodynamics. Ion-images for NO(X) resolved in Λ-doublet levels were collected with a hexapole state selective cross molecular beam ion-imaging apparatus using linearly polarised light. Scattering angle resolved rotational alignment moments were retrieved from the images using a newly developed data analysis algorithm. The agreement is excellent between the experimental and the quantum data. To the best of our knowledge this is the first instance when experimental Λ-doublet resolved alignment moments are reported.

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