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Integral Cross Sections for the Electron Impact Excitation of Molecular Nitrogen

C.P. MALONE, P.V. JOHNSON, I. KANIK, Jet Propulsion Laboratory, Caltech, MS 183-601, 4800 Oak Grove Drive, Pasadena, CA 91109, USA, S. WANG, M.A. KHAKOO, Department of Physics, California State University, Fullerton, CA 92834, USA — Integral cross sections (ICSs) for the electron impact excitation of the X $^1\Sigma^+_g (v''=0)$ ground level to the $a''^1\Sigma^+_g$, $b^1\Pi_u$, $c^1\Pi_u$, $o^1\Pi_u$, $b''^1\Sigma^+_u$, $c_4^1\Sigma^+_u$, $G^3\Pi_u$, and $F^3\Pi_u$ states of N$_2$ are reported at incident energies of 17.5eV, 20eV, 30eV, 50eV, and 100eV. The ICSs were obtained from integrating recent differential cross sections, which were obtained by unfolding new energy-loss spectra taken at electron scattering angles ranging from 2° to 130°. The analysis of the spectra followed a different algorithm from that employed in a previous study of N$_2$ for the valence states by Khakoo et al. [Physical Review A 71, 062703 (2005)], since the $^1\Pi_u$ and $^1\Sigma^+_u$ states form a strongly-interacting Rydberg-valence series. The present results are compared to existing cross sections.

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