High-resolution Absorption Cross Sections of Nitrogen in the 86.1-79.9 nm Region

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An ongoing program at the Harvard-Smithsonian Center for Astrophysics and at the Steacie Institute for Molecular Sciences of the National Research Council in Ottawa aims at establishing reliable high-resolution cross sections for nitrogen in the 99.4-66.5 nm region of the dipole-allowed absorption spectrum (1). At the longest wavelengths, the data can contribute to a better understanding of the energetics of the Earth's upper atmosphere and to the interpretation of spacecraft-based observations of the atmospheres of the planetary satellites Titan and Triton (2). At intermediate wavelengths, the quantitative measurements in the near-threshold region complement the spectroscopic input data into multichannel quantum defect (MQD) calculations that seek to reproduce the observed spectrum by taking account of various channel interactions of the p and f Rydberg series with core-excited levels (3). Finally, the insight gained from the analyses of the discrete spectra can be used to extend the MQD calculations into the diffuse above-threshold region where quantitative absorption data become the principal source of information to guide the analysis. A preliminary analysis of room temperature and jet-cooled photoabsorption cross section measurements in the 79.9-86.2 nm region, carried out at the Photon Factory synchrotron radiation facility, will be presented.

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