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Photoionization of the N^+, NH^+ and NH_2^+ ions in the region of the K-threshold[1] B. M MCLAUGHLIN, Queen's U. Belfast, J.-P. MOSNIER, E. T. KENNEDY, Dublin City University, E. SOKELL, University College Dublin, J.-M. BIZAU, D. CUBAYNES, S. GUILBAUD, Université Paris-Saclay and Synchrotron Soleil, S. CARNIATO, Sorbonne-Universitiés — The MAIA photon-ion merged-beam apparatus at the SOLEIL synchrotron in France was used to measure single and double photoionization cross-sections in the photon region straddling the nitrogen K-edge (∼450 eV), for the atomic N^+ and molecular NH^+ and NH_2^+ species. This extends prior work on N^+ into the Rydberg region ($1s \rightarrow np$, $n > 2$ excitations), manifesting as sharp structures between 420 and 435 eV, up to and over the K-ionization threshold. Photoionization of the NH^+ and NH_2^+ molecular ions were measured for the first time. The main fragmentation routes following $1s$ excitation in NH^+ and NH_2^+ produced mostly the N^{2+} species. The spectral patterns are similar to N^+: Strong discrete structures near 400 eV ($1s \rightarrow 2p$ excitations), followed by a Rydberg structure in the 410 - 430 eV regions. Significant broadening effects are apparent, testimony to the influence of the molecular vibrational degrees of freedom on the inner-shell photoionization process. The N^+ experimental spectra are compared with results of ab-initio RMPS and MCDF calculations, and the molecular spectra with the configuration-interaction single (CIS) method.

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