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Optical Fluorescence of Long Lived States in NO^{+}[1] EMILY MOUNT, SAM RONALD, NICK POPE, ADRIAN DAW, ANTHONY CALAMAI, Appalachian State University — By examining the UV and VUV photons emitted from a population of NO^+ ions stored in a radio-frequency ion trap, we have observed the optical fluorescence of at least two long-lived excited states of NO^+. These states lie above the NO^+ $a^3\Sigma^+$ metastable state and have significantly shorter apparent lifetimes, Calamai and Yoshino J. Chem. Phys. 101 (1994) 9480, than the $a^3\Sigma^+$ state. The measurements we present in this work were obtained as part of a systematic plan to study reaction rate coefficients, decay rates, and cross sections for metastable states of molecules containing nitrogen and/or oxygen. Small atomic and molecular ions, such as O^+, O^{2+}, O_2^+, O_2^{2+}, N^+, N_2^+, N_2^{2+}, and NO^+, are particularly relevant to the Earth's ionosphere. By improving our knowledge of radiative and collisional parameters associated with metastable states of these ions, significant uncertainties in current ionospheric models will be minimized, and our understanding of the ionosphere will be improved. Data and tentative assignments of the radiative decay signals are presented and discussed.

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