

Atomic collision processes in aurora

Malkhaz Gochitashvili^{a)} *Ramaz Lomsadze*^{a)}, *Roman Kezerashvili*^{b)}

e-mail: malkhaz.gochitashvili@tsu.ge

^{a)}Department of Physics, Faculty of Exact and Natural Sciences
Ivane Javakhishvili Tbilisi State University

3, I. Chavchavadze Avenue, Tbilisi, 0179, Georgia

^{b)} Department of Physics, New York University, Brooklyn, USA.

The paper discusses the mechanism of aurora using Earth, Jupiter, and Saturn as examples. Experimental results are presented, which include excitation processes in collisions of electrons, protons, helium, and metastable oxygen ions with hydrogen H_2 , Nitrogen N_2 , and Oxygen O_2 molecules. Excitation functions are obtained for the first negative and Meinel systems of the Nitrogen molecular ion, as well as for the dissociation products of nitrogen and Oxygen, N^* , N^{++} , O^* , O^{++} .

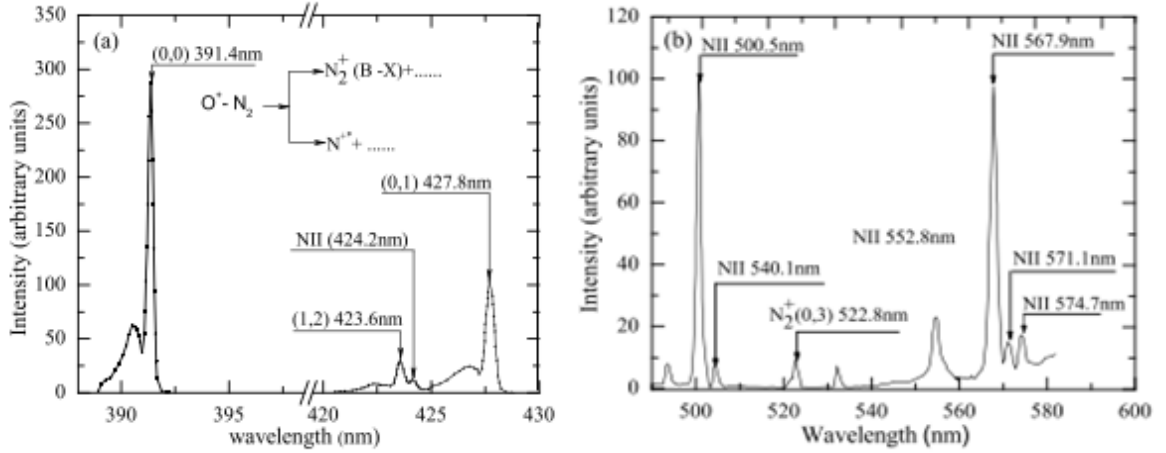


FIG. 1: Relative excitation cross section of the (0,0), (0,1), and (1,2) bands of N_2^+ ion and dissociative product of N^+ ionic lines in $O^+ - N_2$ collision at the energy $E = 5 \text{ keV}$ and pressure in the ion source $P = 7 \cdot 10^{-3} \text{ Torr}$. Observed wavelengths are as labeled on the figure. (a) (0,0); (0,1) and (1,2) bands of N_2^+ ion and NII(424.2nm) line of N^+ . (b) (0,3) band of N_2^+ ion and NII 500.5 nm, NII 540.1 nm, NII 552.8 nm, NII 567.9 nm, NII 571.1nm, and NII 574.7 nm lines of N^+ .