3D DISTRIBUTION OF INTERSTELLAR OXYGEN ATOMS IN THE HELIOSPHERE

VLADISLAV IZMODENOV(1, 2, 3), Dmitry Aleksashov (2,3), Olga Katushkina (1,2)

(1) Lomonosov Moscow State University, Russia
(2) Space Research Institute (IKI) Russian Academy of Sciences
(3) Institute for Problems in Mechanics Russian Academy of Sciences

This paper presents results of new model calculations of interstellar oxygen flow in the region of the solar wind interaction with the local interstellar medium and inside the heliosphere. Oxygen atoms are of particular interest, because they are strongly coupled with the protons through charge exchange reactions, and because they are now observed under the form of pick-up ions and anomalous cosmic rays, and will be observed directly on board of Interstellar Boundary Explorer (IBEX). The measurements provide observational tests of the processes at work at the boundary of the heliosphere. Our calculations are based on Izmodenov et al. (2005) model of the solar wind/interstellar medium interaction that takes into account 3D effects of the interstellar magnetic field. Distributions of the interstellar oxygen atoms and ions are computed through the H and H+ interface. The model accounts for direct charge-exchange (O atoms with protons), reverse charge-exchange (O ions with neutral H), photoionization and solar gravitation. Source distributions of O+ pick-up ions resulting from oxygen atom ionization are also produced, as well as density distributions of the oxygen ions in the heliosphere, assuming that newly created oxygen ions are instantaneously assimilated to the plasma. Inside the TS interstellar oxygen is modeling according to advanced hot-type model (Katushkina & Izmodenov, 2009). Fluxes of interstellar oxygen at 1 AU that can be directly compared with IBEX measurements will be presented.

heliosphere, interstellar atoms, heliospheric interface

V. Izmodenov, e-mail: izmod@iki.rssi.ru