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Primary and secondary populations of the interstellar oxygen in 3D heliosphere

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The interstellar neutral atoms cross the region of the solar wind (SW) with the ionized component of the local interstellar medium (LISM) and enter the heliosphere. The properties of the neutral gas inside the heliospere depends on both the interface structure and the strength of the atom-plasma interaction, i.e. on the atom type. In this paper we consider the penetration of the interstellar oxygen through the 3D SW/LISM interaction region. Oxygen atoms are of particular interest, because they are strongly coupled with the protons through charge exchange reactions, and because the fluxes of interstellar oxygen are directly measured on board of Interstellar Boundary Explorer (IBEX). Our calculations are based on the 3D kinetic-MHD heliospheric model (Izmodenov et al., 2005, 2008) where effects of the interstellar magnetic field (IsMF) are taken into account. The model accounts for direct charge-exchange (O atoms with protons), reverse charge-exchange (O ions with neutral H), photoionization, electron impact ionization and the solar gravitation.
The parameters of both the primary interstellar and the secondary populations, which are the atoms created in the SW/LISM interaction region due to charge exchange, are calculated at the termination shock. Fluxes of the primary and secondary populations of oxygen atoms at 1 AU are calculated in the IBEX energy range.