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Secondary population of neutral interstellar helium observed by IBEX-Lo: preliminary analysis

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Interstellar Boundary Explorer (IBEX) recently discovered that the flow parameters of neutral interstellar helium at the entrance to the heliosphere are significantly different than previously thought and additionally that a portion of the observed helium signal cannot be explained on the grounds of a single-population Maxwellian gas. This brought the conclusion that another source of neutral helium exists in the vicinity of the heliosphere. This source may be charge exchange between neutral interstellar atoms and interstellar He+ ions in the outer heliosheath, which results in the creation of a secondary population of neutral He atoms in a process similar to the creation of the secondary component of neutral interstellar hydrogen. While the flow of the secondary population of He is expected to be more complex than the simple solar gravity-modified flow of the primary population, we assume that the secondary population can be described by a homogeneous Maxwellian distribution function. Starting from the parameters of the secondary He population predicted by the Moscow MC model of the heliosphere, we fit the flow parameters to the IBEX-Lo data from the orbits in 2010 on which the secondary population is clearly visible. Preliminary values of the flow parameters are markedly different from the flow parameters of the primary population both in the flow direction and in the magnitude of velocity and temperature, which suggests a strong deformation of the heliosphere from axial symmetry by interstellar magnetic field.