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A cone-like enhancement of polar solar corona plasma and its influence on heliospheric particles

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We will present results of the study of the properties of the solar wind plasma due to rotation of the polar solar corona. We focus in our study on the solar minimum conditions, when the polar coronal holes are well formed and the magnetic field in the solar polar corona exhibit almost regular "ray-like" structure. The solar rotation twists the magnetic field lines of the expanding fast polar solar wind and the resulting toroidal component of the field induces a force directed towards the rotation axis. This phenomenon is tantamount to a (weak) zeta pinch, known also in other astrophysical contexts (e.g. like in AGN jets). The pinch compresses the polar solar corona plasma and forms a cone-like enhancement of the solar wind density aligned with the rotation axis in the spherically symmetric case. The effect is likely very dynamic due to fast changing conditions in the solar corona, however in the study presented here, we assume a time independent description to get an order-of-magnitude estimate. The weak pinch is treated as a first-order perturbation to the zeroth-order radial flow. Following the assumptions based on the available knowledge about the plasma properties in the polar solar corona we estimated the most typical density enhancements. The cone like structure may extend as far from the Sun as tens of AU and thus will influence the heliospheric particles inside the heliosphere. An increase of the solar wind density in the polar region may be related with a decrease of the solar wind speed. Such changes of the solar wind plasma at high latitudes may modify the charge-exchange and electron impact ionization rates of heliospheric particles in interplanetary space. We will present their influence on the interstellar neutral gas and energetic neutral atoms observed by IBEX.