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Strahl Properties in the slow Solar Wind: Observations

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We have performed a statistical study of a substantial amount of electron data acquired in the slow solar wind to describe the properties of the non-thermal part, namely the STRAHL population, of the electron velocity distribution functions. We use a large data set of electron measurements from three different spacecraft (HELIOS I, CLUSTER II and ULYSSES) acquired in low ecliptic latitudes covering the radial distance from the Sun from 0.3 up to 4 AU. Beside the thermal CORE, the electron velocity distribution functions in the solar wind typically exhibit two non-thermal features: supra thermal tails known as the HALO population and the STRAHL. This last component is highly aligned in the direction parallel to the interplanetary magnetic field and is largely moving away from the Sun. Even thought it comprises less than a few percents of the total number density, it is fundamental to study some important solar wind plasma properties. Thanks its attributes, the STRAHL is responsible for the main part of the electron heat flux and it can also provide a possible source of electron kinetic plasma instabilities. In order to reach our main goal we are using a new analytical model to fit the measured data. This model distinguish thermal and non-thermal electrons and includes the STRAHL component as well. Here we present a preliminary study of obtained results.