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TITLE: Solar Wind Strahl Observations and their Implication to the Core-Halo formation due to Scattering

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ABSTRACT BODY: A study of the kinetic properties of the strahl electron velocity distribution functions (VDF's) in the solar wind is presented. This study focuses on the mechanisms that control and regulate the electron VDF's and the stability of the strahl electrons in the solar wind; mechanisms that are not yet well understood. Various parameters are investigated such as the strahl-electron density, temperature anisotropy, and electron heat-flux. These parameters are used to investigate the stability of the strahl population. The analysis check for whether the strahl electrons are constrained by some instability (e.g., the whistler or KAW instabilities), or are maintained by other types of processes. The electron heat-flux and temperature anisotropy are determined by modeling of the 3D-VDF's from which the moments properties of the various populations are obtained. The results of this study have profound implication on the current hypothesis about the probable formation of the solar wind halo electrons produced from the scattering of the strahl population. This hypothesis is strengthened by direct observations of the strahl electrons being scattered into the core-halo in an isolated event. The observation implies that the scattering of the strahl is not a continuous process but occurs in bursts in regions where conditions for wave growth providing the scattering are optimum. Sometimes, observations indicate that the strahl component is anisotropic (Tper/Tpal ~ 2). This provides a possible free energy source for the excitation of whistler waves as a possible scattering mechanism, however this condition is not always observed. The study is based on high time resolution data from the Cluster/PEACE electron spectrometer.