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Electron Velocity Distributions Just Behind the Earth's Bow Shock and in the Magnetosheath

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Electron velocity distributions just behind the bow shock and in the magnetosheath are studied to identify the process or processes that bring about perpendicular anisotropy ($T_{\perp e} > T_{\parallel e}$) in the magnetosheath electrons. We employ simultaneous multi-spacecraft data obtained by the Plasma Electron And Current Experiment (PEACE) onboard Cluster. We have found that the electron velocity space distributions just behind the bow shock are nearly isotropic with a slight $T_{\parallel e} > T_{\perp e}$ anisotropy whereas the ones deeper in the magnetosheath exhibit a significant $T_{\perp e} > T_{\parallel e}$ anisotropy. We find evidence for two processes that contribute to the sheath anisotropy. There is a clear decrease of suprathermal electrons at 0° and 180° pitch angles, suggesting that this population suffers losses, e.g., into the upstream region. Additionally, an ongoing mechanism inflates the 90° pitch angle suprathermal electron population.