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Challenges of electron-scale measurements in the solar wind

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Acceleration processes in space plasmas are complex because they involve the interaction of particles with electromagnetic fields that may be distributed both in space and time. Understanding these processes in the solar wind requires high-time resolution observations at electron-scale. In this weakly magnetized medium, measuring both the energy spectrum and the 3D pitch-angle electron distribution at high-time resolution remains one of the main challenges of space plasma instrumentation. We both present the scientific challenges of these electron-scale measurements in the solar wind and recent advances in the development of high-time resolution electron spectrometers.