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Observation of high Kinetic Energy Density Jets in the Earth's Magnetosheath

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The region downstream of a supercritical collisionless shock is known to be in a highly disturbed turbulent state. The example best investigated is the magnetosheath, the transition region between the Earth's bow shock and the magnetosphere, exhibiting several distinct wave modes like mirror and ion cyclotron waves. In this paper, we make use of Interball, Cluster and Double Start data to prove that in the magnetosheath spatially localized long living structures are frequently formed with kinetic energy density far exceeding the undisturbed solar wind kinetic energy density. We conclude that these structures, which we call high kinetic energy density jets, play an important role in the energy dissipation and plasma transport. Moreover, we argue that the mechanism of their formation is different from magnetic reconnection.