



In situ spacecraft observations of suprathermal ion acceleration in the reconnection jet braking region

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Reconnection jet fronts and jet braking regions are sites of strong particle energization in space and astrophysical plasmas. Jet fronts are the boundaries separating ambient from reconnection jets while braking regions is where jets are eventually stopped/diverted. Examples are jet fronts and braking regions can be found in planetary magnetospheres, loop-top regions in the solar corona during flares and astrophysical jets. Jet braking regions have been also recently reproduced in laboratory experiments. A number of recent in situ observations in the Earth's magnetotail have allowed studying in detail electron energization mechanisms at jet fronts/braking regions. Yet, observations of suprathermal ions are scarce. Here we show Cluster spacecraft observations in the near-Earth jet braking region of suprathermal protons and oxygen up to ~ 1 MeV, that is about 10 times their thermal energy. Observations indicate that ions are trapped between large-scale oppositely-directed jets and accelerated therein by strong electric fields. We discuss possible applications of this acceleration mechanism to solar and other astrophysical plasmas.