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Multiplet structure and spatial-temporal characteristics of acceleration processes in the distant magnetotail.

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We have studied ion distributions measured in the Plasma Sheet Boundary Layer (PSBL) of the Earth's magnetotail by the Cluster-2 spacecraft at X˜-15Re. Field-aligned ion beams (beamlets) accelerated in the magnetotail up to energies of ˜30keV are typically observed within the interface region between the Plasma Sheet (PS) and the magnetotail lobes. PSBL beamlets are produced by non-adiabatic ion acceleration in the vicinity of X-line which is located, during quiet periods, in the distant parts of the magnetotail. Earlier kinetic model attributed the filamentary and/or bursty manifestations of these processes to current sheet resonances and predicted the scaling law for the velocity of subsequent structures as VN˜Nˆ2/3. We report experimental evidences on the existence of such resonant structures in ion velocity space as measured by Cluster-2 within the PSBL layer and provide the statistically proven identification of such a scaling law for quiet and moderately disturbed periods. Spatial and temporal characteristics of beamlets observed in the outer part of the PSBL are also considered.