# Spatial-temporal characteristics of ion acceleration sites in the Current Sheet of the Earth's magnetotail. Multipoint Cluster observations.

**E.E. Grigorenko** (1), J.A. Sauvaud (2), L.M. Zelenyi (1)

(1) Space Research Institute of RAS, Moscow, Russia, (2) Centre d'Etudie Spatial des Rayonnements, Toulouse, France

The processes of non-adiabatic ion acceleration occurring in the vicinity of magnetic X-line produce highly accelerated (up to 2500km/s) field-aligned ion beams (beamlets) with transient appearance streaming earthward in the PSBL of magnetotail. Previous studies of these phenomena based on the data from one-spacecraft missions supported a view on beamlets as of temporal transients, since the typical time of beamlet observation at a given spacecraft was ˜1-2min. Now multipoint Cluster observations brought new understanding of these phenomena as having a rather spatial than temporal structure. Comparison of data from different Cluster spacecraft allows to evaluate the duration of beamlets to be, at least, 5-15 min and confirms their well-defined localization along Y (Z) directions, i.e. across the lobe magnetic field. Earlier results reporting shorter duration of beamlet observations could be understood by the invoking of an additional effect revealed by Cluster: earthward propagation of kink-like perturbations along the beamlet filaments. Phase velocity of these perturbations is of the order of the local Alfven velocity (V ˜ 600-1000km/s) and related fast flappings of localized beamlet structures in Y-Z direction significantly decreases the time of their observation at a given spacecraft. Such Alfvenic-type disturbances may be caused by classical fire-hose instability which develops at the moment of beamlet ejection from the CS to the lobe region of the distant magnetotail, where the lobe magnetic field is not too large and the conditions for a such pressure anisotropy instability could be satisfied.