

# **Estimation of plasma density from the actively controlled Cluster spacecraft potential**

**K. Torkar** (1), P.-A. Lindqvist (2), P.M.E. Décréau (3), I. Dandouras (4), A.N. Fazakerley (5), H. Kahn (5), H. Laakso (6), H. Jeszenszky (1)

(1) Space Research Institute, Austrian Academy of Sciences, A-8042 Graz, Austria, (2) Royal Institute of Technology, Stockholm, Sweden, (3) LPCE/CNRS, Orleans, France, (4) CESR/CNRS, Toulouse, France, (5) Mullard Space Science Laboratory, University College London, Holmbury St. Mary, United Kingdom, (6) Research and Scientific Support Department, ESA/ESTEC, The Netherlands (klaus.torkar@oeaw.ac.at/Fax: +43-316-4120-590)

The floating potential of a sunlit spacecraft is largely determined by plasma density and can be used for estimations and the identification of plasma boundaries. It is widely thought that active control of the spacecraft potential by an energetic ion beam would remove these possibilities. It can be shown, however, that the control method applied onboard Cluster leaves small residual variations of the potential which are sufficient for a surprisingly accurate reconstruction of the uncontrolled potential, which then can serve for density estimations as usual. The method, the applicable conditions, the achieved accuracy and results based on Cluster measurements are described.