



## **Cosmic dust detection by the Cluster spacecraft: First results**

Jakub Vaverka (1), Alexandre De Spiegeleer (1), Maria Hamrin (1), Johan Kero (2), Ingrid Mann (1,3), Carol Norberg (1,2), Asta Pellinen-Wannberg (1,2), and Timo Pitkänen (1)

(1) Department of Physics, Umeå University, Sweden, (2) Swedish Institute of Space Physics, Kiruna, Sweden, (3) EISCAT Scientific Association, Kiruna, Sweden

There are several different techniques that are used to measure cosmic dust entering the Earth's atmosphere such as space-born dust detectors, meteor and HPLA radars, and optical methods. One complementary method could be to use electric field instruments initially designed to measure electric waves. A plasma cloud generated by a hypervelocity dust impact on a spacecraft body can be detected by the electric field instruments commonly operated on spacecraft. Since Earth-orbiting missions are generally not equipped with conventional dust detectors, the electric field instruments offer an alternative method to measure the Earth's dust environment.

We present the first detection of dust impacts on one of the Earth-orbiting Cluster satellites with the Wideband Data Plasma Wave Receiver (WBD). We first describe the concept of dust impact ionization and of the impact detection. Based on these considerations the mass and the velocity of the impinging dust grains can be estimated from the amplitude of the Cluster voltage pulses. In the case of the Cluster instrument an automatic gain control adjusts the dynamic range of the recorded signals. Depending on the gain level the impact signal can both be affected by saturation or be too weak for analysis. We describe how this influences the duty cycle of the impact measurements. We finally discuss the suitability of this method for monitoring dust fluxes near Earth and compare it with other methods.