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Ion measurements of the Rosetta ROSINA-RTOF sensor and its relevance for the ion measurements at comet 67 P/Churyumov-Gerasimenko

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The RTOF sensor is a Reflectron-type Time of Flight mass spectrometer within the Rosetta ROSINA (Rosetta Orbiter Spectrometer for Ion and Neutral Analysis) instrument package. ROSINA consists of two mass spectrometers, a double focusing mass spectrometer (DFMS) and a time of flight mass spectrometer (RTOF), and a cometary pressure sensor (COPS). A data processing unit steers and controls the three sensors. ROSINA is designed to analyze the volatile material (cometary neutrals and cometary ions) in the vicinity of comet 67 P/Churyumov-Gerasimenko (CG) and to characterise the molecular and isotopic composition of CG during the concerted journey from shortly after aphelion to perihelion.

RTOF has two basic operation modes. The first mode is for analyzing the cometary neutral gas and the second one for the direct measurements of the cometary ions. Ion measurements in the vicinity of a comet are of great importance because they will reveal important processes of the interaction of the solar wind with the comet as well as chemical processes, e.g. ion-neutral reactions, photo-chemical reactions in the cometary coma.

We will present the characterisations of the ROSINA RTOF sensor and of the newly

designed low energy ion source (LEIS). Finally, we will discuss the results of the ion measurements that were performed in the laboratory with LEIS providing RTOF with a low-energy ion beam (typically below 20 eV) simulating the expected plasma environment at the comet.