



Simulations as a tool for higher mass resolution spectrometer: Lessons from existing observations

Georgios Nicolaou (1), Masatoshi Yamauchi (1), Hans Nilsson (1), Martin Wieser (1), and Andrei Fedorov (2)

(1) Swedish Institute of Space Physics, Kiruna, Sweden (m.yamauchi@irf.se), (2) Institut de Recherche en Astrophysique et Planetologie (IRAP), CNRS/Universite de Toulouse, Toulouse, France

Scientific requirements of each mission are crucial for the instrument's design. Ion tracing simulations of instruments can be helpful to characterize their performance, identify their limitations and improving the design for future missions. However, simulations provide the best performance in ideal case, and the actual response is determined by many other factors. Therefore, simulations should be compared with observations when possible. Characterizing the actual response of a running instrument gives valuable lessons for the future design of test instruments with the same detection principle before spending resources to build and calibrate them.

In this study we use an ion tracing simulation of the Ion Composition Analyser (ICA) on board ROSETTA, in order to characterize its response and to compare it with the observations. It turned out that, due to the complicated unexpected response of the running instrument, the heavy cometary ions and molecules are sometimes difficult to be resolved. However, preliminary simulation of a slightly modified design predicts much higher mass resolution. Even after considering the complicated unexpected response, we safely expect that the modified design can resolve most abundant heavy atomic ions (e.g., O^+) and molecular ions (e.g., N_2^+ and O_2^+). We show the simulation results for both designs and ICA data.