



## The next step for Rosetta ROSINA/DMFS data of comet 67P/Churyumov-Gerasimenko: the search for semi-volatiles species.

**Frederik Dhooghe**<sup>1</sup>, Johan De Keyser<sup>1,2</sup>, Kathrin Altwegg<sup>3,4</sup>, Gaël Cessateur<sup>1</sup>, Emmanuel Jehin<sup>5</sup>, Romain Maggiolo<sup>1</sup>, and Martin Rubin<sup>3</sup>

<sup>1</sup>Royal Belgian Institute for Space Aeronomy, Brussels, Belgium ([frederik.dhooghe@aeronomie.be](mailto:frederik.dhooghe@aeronomie.be))

<sup>2</sup>Center for Mathematical Plasma Astrophysics, KULeuven, Leuven, Belgium

<sup>3</sup>Physikalisches Institut, University of Bern, Bern, Switzerland

<sup>4</sup>Center for Space and Habitability, Bern, Switzerland

<sup>5</sup>STAR Institute, University of Liège, Belgium

Using data from Rosetta/ROSINA's Double Focusing Mass Spectrometer (DFMS), a zoo of neutral molecules have been discovered in the coma of 67P/Churyumov-Gerasimenko, which led to a wealth of new insights regarding the comet itself, its formation and the early history of our Solar System.

A comprehensive understanding of the overall comet composition requires information on all species involved i.e. the volatiles, semi-volatiles and refractories in the coma. However, while ROSINA targets volatiles and GIADA, MIDAS and COSIMA studied refractories, no instrument on Rosetta provides measurements specifically of semi-volatiles. In some circumstances, ROSINA/DFMS may provide at least some information on semi-volatiles in the coma. As semi-volatile species are progressively released from the grains into the gas coma (their release depends on cometocentric distance and grain size), they can be identified if the abundance ratio of a candidate semi-volatile species (or a fragment thereof) to a volatile species increases as a function of distance from the nucleus. This constitutes a so-called distributed source in the coma.

With a mass spectrometer like DFMS, one does not detect neutral coma species, but rather the ionized products thereof after electron impact ionization. A major difficulty is assigning the observed ions to parent neutrals. As semi-volatile species have a low abundance, sum spectra obtained through accumulation of individual DFMS spectra can improve the signal-to-noise ratio in order to provide decisive information for identification. Accurate sum spectra can only be obtained provided all instrument-dependent effects are accounted for.

This contribution focuses on the procedure used to create sum spectra and presents some typical results.