

## Dusty Isotopes

The isotopic composition of extraterrestrial matter can provide important information about the history of that matter, since isotopic fractionation is sensitive to many conditions such as chemistry, temperature, and radiation. The isotopic ratios of elements have been measured in many extraterrestrial materials, such as chondritic meteorites, interplanetary dust particles, and comets. The great majority of the cometary measurements have been in the gas phase, with relatively few measurements in the dust [1, 2, 3]. Here we present measurements of isotopic composition for several elements measured in cometary dust collected by the COSIMA (COmetary Secondary Ion Mass Analyzer, [4]) instrument.

COSIMA collected 35000 dust particles and fragments from 67P. Practical considerations restricted the number of particles upon which ToF-SIMS analysis was performed to a few hundred, and only a subset of these particles will be discussed here. Comparison to measurements of the isotopic composition of other extraterrestrial matter will be made and the implications for the history of comets will be considered.

[1] Bockelée-Morvan, D. et al. (2015) *Sp. Sci. Rev.* 197, 47.

[2] Biver et al. (2016) *A&A* 589, A78.

[3] Paganini et al. (2017) *ApJ* 826, L25.

[4] Kissel, J. et al. (2007) *Sp. Sci. Rev.*, 128, 823.