# Rosetta/COSIMA: Laboratory time-of-flight secondary ion mass spectra of PAHs for in-situ detection in the cometary solid organic matter

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ESA's spacecraft called ROSETTA will reach the comet 67P/Churyumov- Gerasimenko in August 2014. During the escort phase of the mission, beginning after the lander (Philae) is released, the COmetary Secondary Ion Mass Analyzer (COSIMA) [1] carried on board will collect and analyse dust grains in the cometary coma. COSIMA is a time-of-flight secondary ion mass spectrometer (TOF-SIMS) with a high mass resolution $m/\Delta m$ of 1400 at mass $m = 100$ amu (from FWHM) and mass range from 1 to 3500 amu. The investigations performed by COSIMA on solid cometary grains are aimed to analyze in situ their molecular, elemental, and isotopic composition. The spectra obtained with COSIMA, will be a combination of mass peaks of mineral and organic elements. The organics are expected to be minor peaks, making their identification not simple.

To prepare for the future COSIMA spectra interpretation, the COSIMA team members have started to establish a library database of standardized mass spectra [2,3]. High statistics of positive and negative spectra of the samples were then taken in order to get molecular structure information.

Polycyclic Aromatic Hydrocarbons (PAHs) are organic macromolecules that could survive harsh radiation environment. They are suspected to be responsible for unidentified infrared bands observed in diverse astrophysical environments. Many attempts were made to demonstrate the presence of PAHs in comets. Tentative attributions of fluorescence emission bands have been made of spectra taken during the Vega-2 mission [4,5], and recently on Stardust samples returned [6]. In this work, we have used the COSIMA prototype based in Orléans to analyze PAHs and alkanes molecules deposition on gold targets.

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**References:** [1] Kissel J. et al, Space Science Review, 128, 823–867, 2007. [2] Le Roy L. et al, Planetary and Space Science, 65, 83–92, 2012. [3] Engrand C. et al, Meteoritics & Planetary Science, 42, A42–A42, 2007. [4] Moreels G. et al, A&A, 282, 643, 1994. [5] Clairemidi J. et al, PSS, 52, 761, 2004. [6] Sandford S.A. et al., Science, 314, 1720–1724, 2006.