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HANKA - cubesat space high resolution mass analyser

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Application of mass spectrometry in the space exploration has recently become a hot topic. It can be used for the analysis of space dust, micrometeorites and particles from larger objects.

For the Czech **SLAVIA** (**S**pace **L**aboratory for **A**dvanced **V**ariable **I**nstruments and **A**pplications) satellite project (expected to be launched in 2026 to the SSO 600km orbit) was designed the **HANKA** (**H**motnostný **A**nalýzér pre **K**ozmické **A**plikace) space instrument - a high-resolution Orbitrap-based electrostatic ion trap mass analyser. The instrument is based on a commercial mass analyser¹ established in biology and medicine research, the so-called Orbitrap™ and the space CosmOrbitrap prototype (developed by LPC2E Orleans²). **HANKA** will bring this new technology into space to combine a CubeSat space version (4U) of this ion trap analyzer with an innovative in-situ hypervelocity impact ionization source for micrometeoroids.

A laboratory version of this instrument (**CIARA**) is currently under construction, where ions can be generated by three different methods:

- Photons with molecules in the liquid phase (coupled with experiment **LILBID** (Laser Induced Liquid Bead Ion Desorption))
- Electrons with molecules in the gas phase (**EI** source)
- Photons with solid-phase molecules (**MALDI** or Laser Ablation)

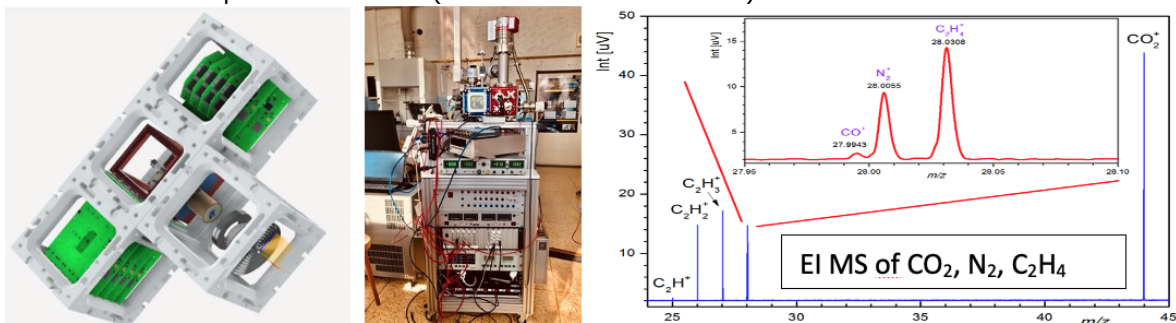


Fig. 1.: **HANKA** - proposal instrument, **CIARA** - laboratory prototyp, preliminary data from EI – source³
Based on the results obtained on the laboratory prototype, a CubeSat version of the high-

resolution space mass spectrometer - **HANKA** - will be constructed.

References

¹Makarov, A.; *Anal. Chem.* **2000**, 72, 1156–1162.

²Briois C, Thissen R, Thirkell L, et al.; *Planet Space Sci.* **2016**, 131, 33–45.

³Zymak Y. et al.; article in preparation