

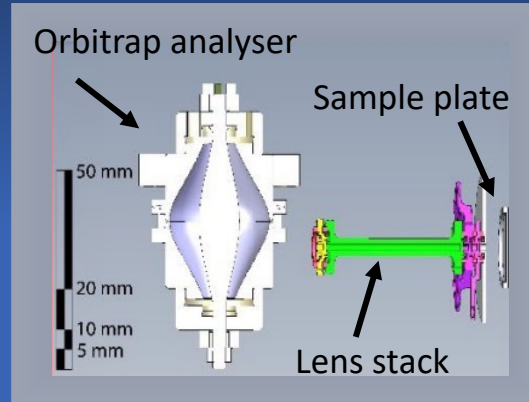
Laser desorption mass spectrometry with an Orbitrap analyser for *in situ* astrobiology

THE PROJECT

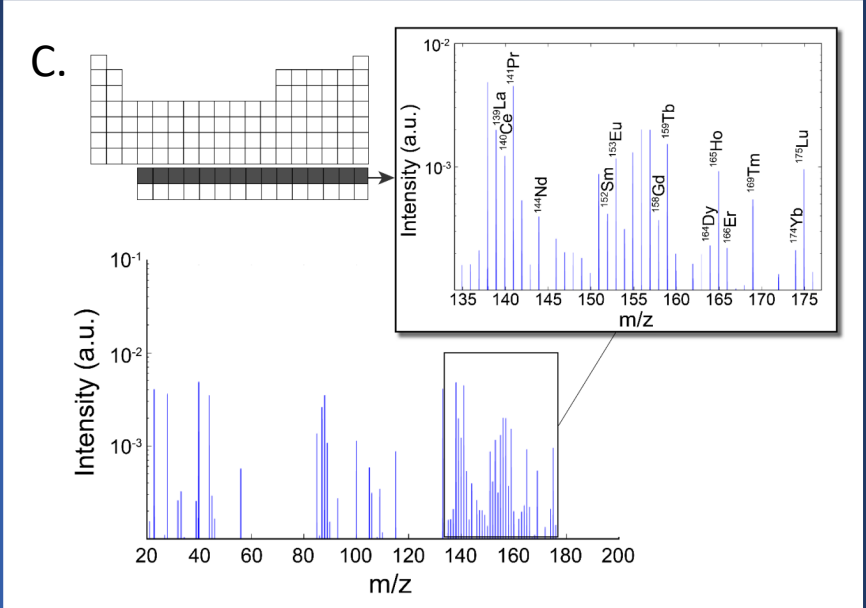
We developed a laser desorption mass spectrometry (LDMS) instrument comprising a pulsed laser source, which generates ultraviolet light to ionize the sample, and an Orbitrap analyser, which detects the ions with higher accuracy and precision than mass spectrometers used in previous spaceflight missions.

Arevalo, R., Willhite, L., Bardyn, A. *et al.* Laser desorption mass spectrometry with an Orbitrap analyser for *in situ* astrobiology. *Nat Astron* (2023). <https://doi.org/10.1038/s41550-022-01866-x>

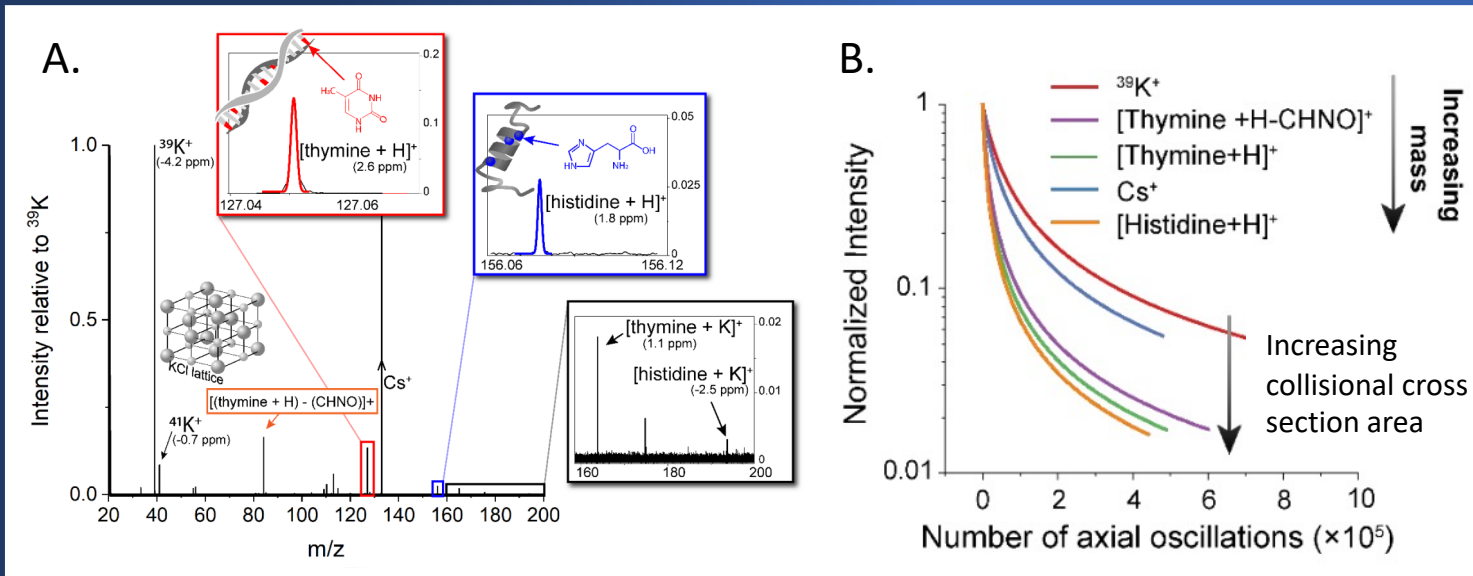
A solid model of the instrument



Detection of trace elements at ppmw level



Detection and characterization of biomarkers in a single spectrum



KEY IMPROVEMENTS

- Achieve mass-resolving powers ($m/\Delta m > 10^5$, FWHM at m/z 100) in both negative and positive mode
- Identify protonated molecular ions and fragments of biomarkers (pmol/mm²) in ocean-world-analogue samples (Fig. A)
- Infer molecular size of analyte from the decay rate of the transient signal as corroborative evidence to enable identification (Fig. B)
- Detect trace elements down to parts per million by weight concentrations (Fig. C)