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CHEMICAL MEASUREMENTS OF NIM ON JUICE, ESA MISSION TO JUPITER SATELLITES (2028)

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Statement of the Problem: JUICE, the L-class mission of ESA to explore the Jupiter system will deliver chemical measurements of the Jupiter satellites exospheres, the icy moons Europa, Ganymede and Callisto. One of the instruments in the PEP consortium employed on the mission will the neutral gas mass spectrometer as part of the particle consortium (PEP). We develop prototypes of the instrument to test against the physical and environmental conditions expected in the Jupiter environment, and measurements near these moons. The exospheres of the icy moons are populated by material originating directly from the moons' surfaces, thus NIM measurements can be inverted to derive the chemical composition of the surface. By studying the composition of all three icy moons we will also get crucial information on the evolution of these objects with time, since they started from the same chemical inventory. We started unique laboratory experiments simulating the icy surfaces of these moons and their response to particle radiation in forming their exospheres; in parallel we develop necessary shielding against the high energy radiation to protect the instruments and theoretical models of the atmospheres of these moons, both in preparation of the science phase of this mission.

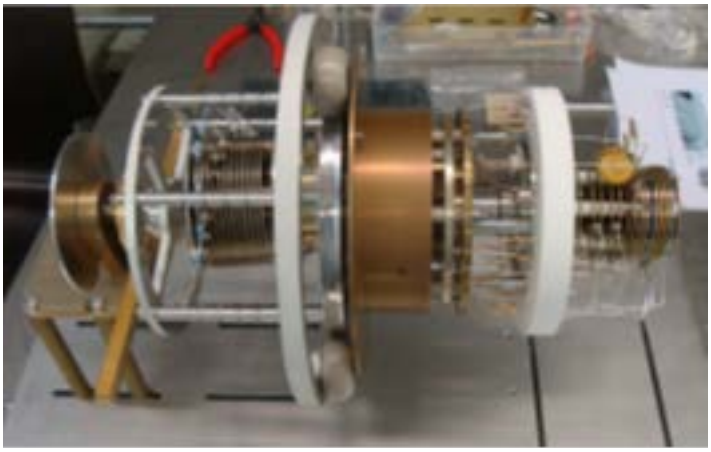

Fig.1. NIM prototype mounted in fixture for installation in the STROFIO chamber for the CASYMIR neutral beam facility. The ion source is on the right side, the ion mirror on the left, and the detector is the top-most part on the white structure.

BIOGRAPHY

Marek Tulej has completed his PhD from Basel University, Switzerland. Currently, he is the staff member of planetary sciences and space research division and head of Laser mass spectrometry lab in Physics Institute Bern. He is involved in the development of a miniature analytical instruments for space missions. Currently, He is a Science Group Member for the missions to The Moon (Luna Glob, Luna Resurs) and Jupiter satellites(JUICE). Marek has published more than 80 papers in reputed journals and have been serving as an editorial board member, journal and proposal reviewer.

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