

## Exploring new phenomena in ice clathrates and *filled* ices under planetary conditions

L. E. Bove<sup>1,2</sup>

<sup>1</sup>*IMPMC, CNRS-UMR 7590, Université P&M Curie, 75252 Paris, France*

<sup>2</sup>*Physics Department, Università di Roma La Sapienza, piazzale Aldo Moro 5, 00196, Roma, Italy*

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\*e-mail: liviaeleonora.bove@uniroma1.it

Compressed water is overspread on Earth at depth and in the extra-terrestrial space, both interstellar and on outer planets and moons. Under the extreme p-T conditions experienced in these icy bodies water displays an incredibly rich phase diagram, anomalous dynamical properties, ionisation, proton conductivity, enhanced quantum effects, and unusual chemical affinity for both charged (ions) and inert (gas) species.

In this talk I will review our recent experimental results - obtained combining neutron and x-ray diffraction, incoherent inelastic and quasielastic neutron scattering, and Raman spectroscopy under high pressure - on pure [1-3], salt-doped (LiCl, NaCl, KCl) [4-6], and gas (H<sub>2</sub>, CH<sub>4</sub>) [7-10] filled ices under the extreme conditions experienced in the ice bodies of our solar system.

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