

Seminar

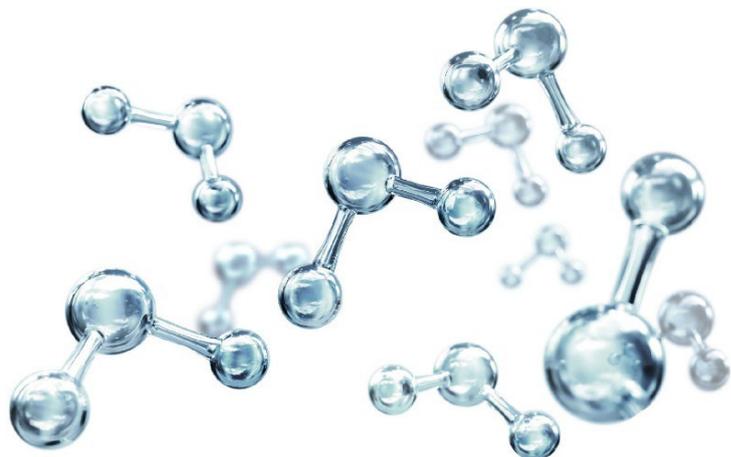
23th of June 2022
12:00 h

Zoom Virtual Meeting:

<https://tuhh.zoom.us/j/82631283465>

Meeting-ID: 826 3128 3465

Password: 978444



Livia E. Bove

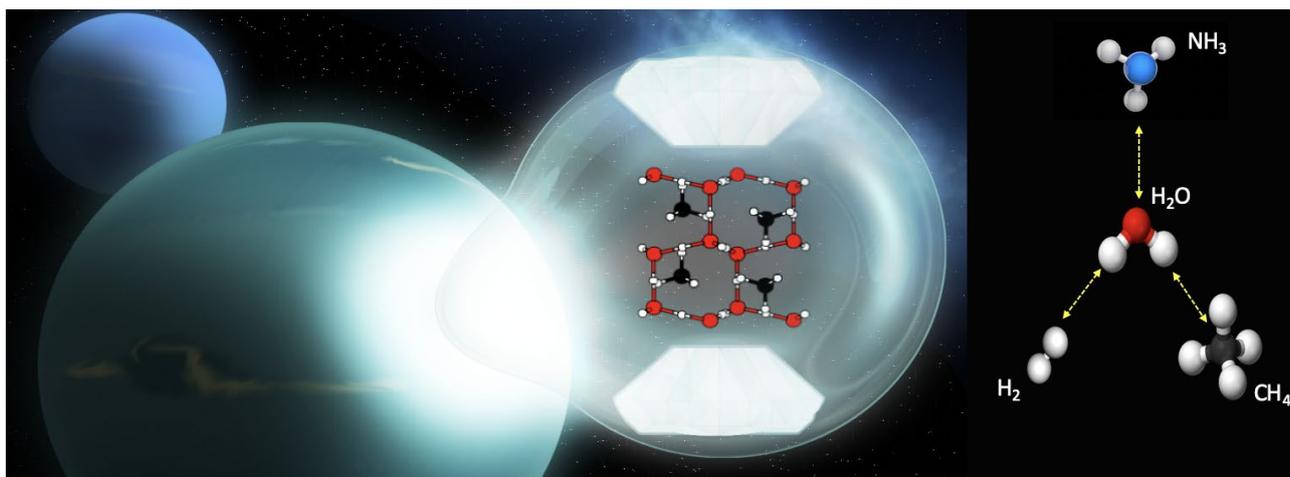
IMPMC, Paris

Sapienza University of Rome

LQM, Ecole Polytechnique Federale Lausanne

New structures and exotic properties of ices and hydrates under planetary conditions

Compressed water, ices mixtures and hydrates are overspread on Earth at depth and in the extra-terrestrial space, both interstellar and on outer planets and moons [1-3]. Under the extreme p-T conditions experienced in these icy bodies ices and hydrates display a rich phase diagram, anomalous dynamical and thermal properties, proton conductivity, and enhanced quantum effects [4-8]. Methane and hydrogen hydrates are also expected to be present under very high pressures (10 to 200 GPa) in giant planetary interiors such as Uranus or Neptune. However, the stability of such structures at these pressures is currently debated. In this talk I will review our recent experimental results - obtained combining neutron and x-ray diffraction, quasi-elastic neutron scattering, and Raman spectroscopy under high pressure with ab-initio simulations - on water, gas (H₂, CH₄) filled ices, and hydrates (NH₃: H₂O) [5-11] under the extreme conditions experienced in the ice bodies of our solar system.



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[1] L. E. Bove et U. Ranieri, *Phil. Trans. R. Soc. A* 377: 0262 (2019).

[2] S. Klotz, L. E. Bove et al. *Nat. Mat.* 8, 405 (2009).

[3] L. E. Bove, R. Gaal, et al., *PNAS* 112, 8216 (2015).

[4] S. Klotz, L.E. Bove, et al., *Sci. Rep.* 6, 32040 (2016).

[5] U. L. Ranieri et al., *Nature Com.*, 8, 1076 (2017).

[6] S. Schaack et al., *JPC C* 122 11159 (2018).

[7] U. L. Ranieri, et al. *J. Phys. Chem. C*, 123, 1888 (2019).

[8] S. Schaack et al., *PNAS*, 10.1073/pnas.1904911116 (2019).

[9] U. L. Ranieri, et al., *Nature Com.* 12: 195 (2021).

[10] M. Rescigno et al., to be submitted (2022).

[11] H. Zhang et al., submitted (2022).