

LadHyX Seminar – May 12th, 10:45

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**Fluid Dynamics of Icy Moon Oceans: Insights from Laboratory Experiments**

In this talk, I will provide an overview of the key mechanisms driving flows in icy moon oceans and how they can be modelled using rotating laboratory experiments. I will first discuss mechanically driven flows, including tides, libration, and precession. Libration (a periodic variation in rotation rate) can generate bulk turbulence via the elliptical instability, which arises from interactions between inertial waves and a base flow. I will present a laboratory analogue to investigate this instability, its onset, and its relevance to planetary conditions. In the second part, I will focus on buoyancy-driven flows, particularly thermal convection. In spherical shells, turbulent convection is influenced by the  $\beta$ -effect, leading to Rossby waves and strong zonal (east–west) flows. I will present laboratory experiments that reproduce this effect using a rapidly rotating water tank with a free surface, and examine the interaction between turbulent convection, zonal jets, and topography.