

## Recent progress on a noise budget for a lunar GW detector

*mardi 10 juin 2025 15:40 (20 minutes)*

The Moon offers a unique environment for gravitational wave (GW) detection thanks to its low seismic noise and lack of atmosphere. During the Apollo missions, the Lunar Surface Gravimeter (LSG) was deployed in an early attempt to detect GWs via ground motion, though it ultimately fell short of its objectives. Today, in the context of renewed lunar exploration, new mission concepts such as LGWA and LILA aim to leverage the Moon's quiet seismic environment to probe the GW spectrum in the deci-Hz band.

In this talk, I will present a feasibility study—conducted in collaboration between geophysicists at IPGP and astrophysicists at APC—for a lunar strainmeter designed to detect GWs via surface deformation in the mHz-band. I will first describe the Moon's response function to gravitational waves, taking into account its internal elastic structure. This allows us to evaluate how a passing GW would couple to measurable surface strain. I will then present a preliminary noise budget for such an instrument, including contributions from quantum noise, mirror thermal noise, laser frequency noise, and deep moonquake noise.

**Author:** VIDAL, Léon (APC/IPGP)

**Orateur:** VIDAL, Léon (APC/IPGP)

**Classification de Session:** Contributions (15' + 5' de questions)