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A Doppler Spectro-Imager dedicated to Jovian seismology and aeronomy onboard on Laplace/EJSM Jupiter Ganymede Orbiter

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Abstract

The internal structure of Jupiter is still mostly unknown: we don't know whether Jupiter has a central dense core or not, and the global amount of heavy elements in its interior varies from 10 to 40 Earth masses, depending on the model considered [1]. This limits considerably our understanding of the formation of the solar system, both because it yields a large uncertainty on the amount of solids that went into the planets, and also because Jupiter has played a crucial role in shaping the solar system.

An efficient constraint on the solar system formation scenario would be given by measuring the total amount of heavy elements inside Jupiter and the size of the planetary core. It has been shown that the observation of oscillation modes up to degree $\ell = 25$ would strongly constrain Jupiter's internal structure by exploring both the hydrogen plasma-phase transition and the supposed core level [2] . The mode eigenfrequencies are expected in the range [1, 3.5] mHz, while the mode amplitude is expected in the velocity range [1, 100] cm/s, which would be observable from a spacecraft approaching the Jupiter system [3].

For this goal, we proposed for the **JGO** payload the Doppler Spectro Imager (**DSI**) instrument, inherited from the ground based network **SYMPA** ([4] and [5]), able to measure these oscillations during the approach phase of the mission **EJSM**/Laplace. Such an instrument would also have an application in the study of the upper troposphere dynamics (3D velocity maps).

We will present the scientific objectives of the mission, the instrumental concept and expected performances, and discuss the plans for the future.

References

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