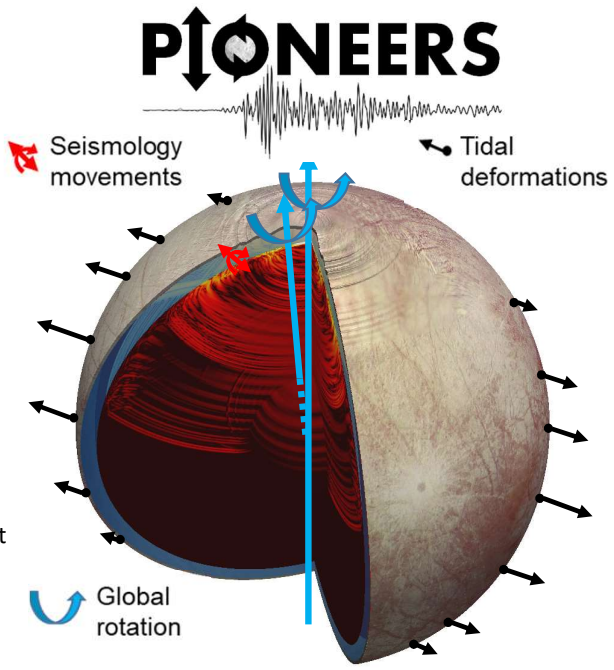
Planetary Instruments based on Optical technologies for an iNnovative European Exploration using Rotational Seismology

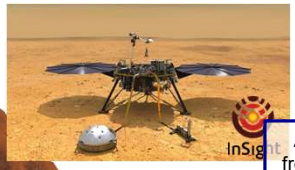
Investigation of the internal structure of planetary objects has become a high priority for space agencies. Consequently, the potential market for instruments sounding the planetary internal structure is huge. In order to keep and reinforce the European leadership in this field, innovative solutions must be developed and validated.

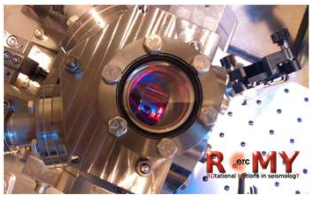


This figure shows the interior of a planet having different material and the phenomena that will be observed for obtaining that information. Courtesy: Stähler et al. (2018), J. Geophys. Res., doi:10.1002/2017JE005338.

The main innovations that are developed through this project are to combine rotation and translation measurements, and to improve the performance of planetary seismometers by two orders of magnitude. This is enabled by the use of optical technology in which Europe has a leadership position.

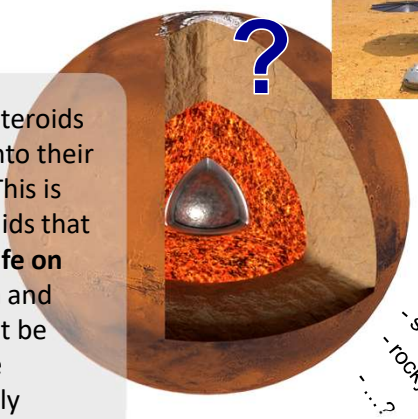
The **PIONEERS** next generation planetary ground motion instrumentation uses **optical fiber sensors** to deliver performance 100x better than existing space seismometers.



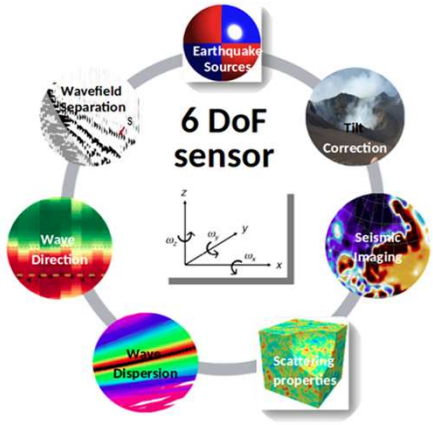


Advancing technology from the **InSight** mission on Mars and from the **ROMY** project on Earth

The **interior structure** of asteroids and planets gives insight into their **formation and evolution**. This is especially crucial for asteroids that could become a **threat to life on Earth**. Interior composition and mechanical properties must be known to develop effective countermeasures, and safely perform **proximity operations** on asteroids with spacecraft.



The new instrumentation measures all **six degrees of freedom (6-DOF):**
x, y, z translations and ωx, ωy, ωz rotations. This returns information **equivalent to small seismic arrays**.



The PIONEERS innovative 6-DOF sensors are first of their kind and will demonstrate technology in space that does not exist yet for Earth.
Learn more on www.H2020-pioneers.eu

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