VIS-NIR imaging spectrometry for NEA investigation

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Imaging spectroscopy is a powerful remote sensing technique used to infer and map the chemical and physical properties of a planetary body. Such instruments have been already and successfully used for a thorough investigation of the surface and atmosphere (if present) of several Solar System objects. Examples are, among the others, the Visible and InfraRed Thermal Imaging Spectrometer (VIRTIS) for the ESA Rosetta and Venus Express missions, the Observatoire pour la Minéralogie, l'Eau, les Glaces et l'Activité (OMEGA) on board the ESA/Mars Express, the Visible and Infrared Mapping Spectrometer (VIMS), the Visible and Infrared (VIR) mapping spectrometer and the JIRAM instrument onboard the NASA Cassini, Dawn and JUNO missions, respectively. Others have just been launched or will be operational in future, e.g. the Spectrometers and Imagers for MPS BepiColombo Integrated Observatory SYStem (SIMBIO-SYS) onboard the ESA BepiColombo mission and the MAJIS instrument on board the ESA JUICE mission.

By taking advantage of this heritage and the potential availability of hardware spare, we explore the possibility to use an imaging spectrometer for the Hera asteroidal target, once adapted to the mission constraints and objectives. As an example, by adapting the VIHI spectrometer channel of SIMBIO-SYS, covering the visible and near-infrared spectral range (0.4-2.0 μm), it would be possible to infer and map the surface mineralogy, the physical properties of the surface regolith and derive potential regional and local trends with a spatial resolution not achievable from ground-based instrumentation. Furthermore, by coupling spectral and spatial capabilities, we could derive chemical and physical properties of the target.