



Local Interstellar Medium Observatory (LIMO): a mission to explore our galactic neighborhood

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LIMO (Local Interstellar Medium Observatory) was proposed as an ESA F-class mission candidate in 2018. LIMO explores our galactic neighborhood and how it interacts with our astrosphere. The European Space Agency (ESA) Cosmic Vision 2015-2025 program recognizes the importance of studying how the Sun meets the interstellar medium and includes a mission, an interstellar probe, to perform such studies. LIMO makes a technically feasible step to achieve these objectives being in the inner heliosphere. LIMO focuses on three main science questions:

- What is the composition of not-condensed matter (gas) in our galactic neighborhood and how does this composition relate to the evolution of our Solar System?
- What is the composition and distribution of the condensed matter (dust) in our galactic neighborhood and its relation to the chemical diversity of our Solar System?
- How does our astrosphere interact with its galactic neighborhood and what is the 3-dimensional structure of the heliospheric interface?

LIMO, being placed at distances up to 3 AU away from the Sun, samples hardly modified by the solar radiation and gravity the interstellar neutral gas and dust. LIMO carries out measurements of unprecedented sensitivity and resolution of the interstellar gas composition and maps dust flows with angular resolution of 1° superior to any present observations. Mapping the dust flow allows LIMO to define the origin of the dust grains and the composition analysis, for the first time, will determine what interstellar and interplanetary dust is made of. LIMO also images the interaction of our astrosphere with the galactic neighborhood via energetic neutral atoms (ENA) with unprecedented 1° angular resolution. This angular resolution combined with the large observation baseline up to 4 AU allows measuring the ENA fluxes parallax and thus establishing the 3D structure of the heliospheric interface.

LIMO carries three main instruments LIDA (LIMO Interstellar Dust Analyzer), LIGA (Local Interstellar Gas Analyzer), and HILMA (Heliosphere Interaction with the Local Medium Analyzer) supported by instruments to monitor UV and charged particle backgrounds. LIMO is propelled by ion engines to reach the 3 AU distance from the Sun within 3.5 years from the L2-point.