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ExoMars Lander Radioscience LaRa, a Space Geodesy Experiment to Mars.

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The LaRa (Lander Radioscience) experiment is designed to obtain coherent two-way Doppler measurements from the radio link between the ExoMars lander and Earth over at least one Martian year. The instrument life time is thus almost twice the one Earth year of nominal mission duration. The Doppler measurements will be used to observe the orientation and rotation of Mars in space (precession, nutations, and length-of-day variations), as well as polar motion. The ultimate objective is to obtain information / constraints on the Martian interior, and on the sublimation / condensation cycle of atmospheric CO_2. Rotational variations will allow us to constrain the moment of inertia of the entire planet, including its mantle and core, the moment of inertia of the core, and seasonal mass transfer between the atmosphere and the ice caps. The LaRa experiment will be combined with other ExoMars experiments, in order to retrieve a maximum amount of information on the interior of Mars. Specifically, combining LaRa's Doppler measurements with similar data from the Viking landers, Mars Pathfinder, Mars Exploration Rovers landers, and the forthcoming InSight-RISE lander missions, will allow us to improve our knowledge on the interior of Mars with unprecedented accuracy, hereby providing crucial information on the formation and evolution of the red planet.