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The mass of (21) Lutetia from radio tracking during the Rosetta flyby

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Abstract

The Rosetta spacecraft will fly by its second asteroid target (21) Lutetia on 10th July 2010[1]. The asteroid will perturb the flyby trajectory and velocity of the spacecraft (closest approach is at 3000 km) and the mass of the asteroid will be determined from the shift of the radio carrier signal frequencies. Pre-flyby simulations show that a mass determination of the asteroid to an accuracy of 1% or better is possible even tough the flyby geometry is suboptimal and there is a tracking gap at closest approach. The Rosetta camera OSIRIS will determine the size and volume of Lutetia, the bulk density may be derived from the determined mass and volume. The precision of the bulk density is driven by the precision of the volume estimate. Knowledge of the mass and bulk density is an important contributor to understand the asteroid´s composition, internal structure and porosity and may probably also give clues for the definition of the asteroid´s type. Lutetia is considered to be a major perturber of a number of smaller asteroids. The derived mass from the flyby will therefore be compared with those mass values derived from asteroid orbit perturbations.

[1] This event is still in the future at the time of abstract submission