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Rosetta Radio Science Investigations (RSI)

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In March 2004 the ROSETTA spacecraft was launched to investigate the comet P/Churyumov-Gerasimenko that will be reached in the year 2014.
The ROSETTA Radio Science Experiment (RSI) makes use of the onboard radio subsystem and adresses fundamental aspects of cometary physics. RSI is interested in Doppler frequency shifts of the spacecraft transmitted radio carrier signals caused by pertubing forces (gravity field, gas and dust mass flux) acting on the spacecraft and dispersive frequency shifts due to the propagation of the radio carrier signals through ionized media as well as their signal power and polarization.
The observations allow to determine the mass and bulk density of the nucleus, its size and shape, as well as the lower harmonics of its gravity field, the dielectric properties of the nucleus surface, the abundance of large dust grains and the electron content in the cometary coma. In addition, the mass and bulk density of the asteroid Lutetia may be determined during the flyby in 2010.
The results of the first measurements carried out during the successful commissioning phase in 2004 which provided an insight into the sensitivity levels of the experiment will be presented.