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First results from the ionospheric radio occultations of Moon by spacecrafts

S. Pluchino (1), F. Schillirò (2), P. Cassaro (2)

(1) IRA-INAF, Medicina Radiotelescopes, Villafontana Bo, Italy, (2) IRA-INAF, VLBI Station, Noto Sr, Italy (salvo@med.ira.inaf.it / Fax: +39 051-6965810 / Tel: +39 051-6965826)

The first set of radio occultations of the lunar ionosphere was obtained in the spring of 2006 when the European Probe SMART-1, then in orbit around the Moon, would have crashed on the Moon surface on Sunday, September 3^{rd}. During the week prior to the crash, between August 29^{th} and September 3^{rd} 2006, our team gathered radio data in S and X-band from the occultations of SMART-1 by the Moon by virtue of the two 32-meter IRA radiotelescopes of the Italian National Institute for Astrophysics located in Medicina (Bologna) and in Noto (Siracusa).

We are working on the last set of experiments that will be completed during the next lunar occultations of Saturn and Venus. On 22 May 2007 the Cassini spacecraft, orbiting around Saturn, will pass behind the Moon as viewed from the Earth; similarly on 18 June 2007 the Venus Express spacecraft, orbiting around Venus, will be occulted by the Moon. The radio occultation experiments refers to a sounding technique in which a radio wave from an emitting spacecraft passes through an intervening planetary atmosphere before arriving at the receiver. The receiver measures the phase and amplitude of the wave over the duration of the occultation event. The phase and amplitude of the wave at the receiver are consequently altered with respect to the original values – i.e. the ones they would have without the intervening medium or the occulting planet.