German spectrometer flies to the Moon

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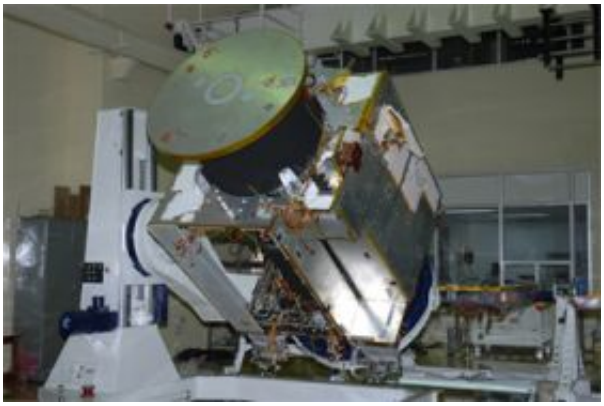

The SIR-2 spectrometer, designed and built in Lindau, following integration into the lunar probe in Bangalore. Image: ISRO, Bangalore

India's first mission to the Moon, Chandrayaan-1, is scheduled to take off from the Satish Dhawan Space Centre on the south-eastern coast of India on Wednesday, October 22nd, at 3.00 CEST. The German science and technology contribution to the mission comprises an infrared spectrometer designed and built by the Max Planck Institute for Solar System Research (MPS) in Katlenburg-Lindau. The spectrometer will play a fundamental role in the production of the first high-resolution global mineralogical map of the Moon.

The Moon is crucial to the understanding of the Earth's history. While both originated about 4.5 billion years ago, evidence of these early times has been mostly erased on Earth by tectonics, weather and life. On the Moon these signs have been preserved in the geological and

mineralogical composition. Past lunar missions, however, have succeeded only in studying selected areas of the Moon's surface. These missions were often very limited in time and instrumentation or had an elliptical orbit that in part carried the space probe far away from the Moon.

Chandrayyan-1 will accompany the Moon for two years. The mission will benefit from a low circular orbit of 100 km above the surface and a complementary array of several new and advanced scientific instruments. In particular, this will allow the infrared spectrometer SIR-2 from Max Planck Institute for Solar System Research (MPS) to help map the main mineralogical components of the lunar surface with unprecedented reliability and resolution.

The SIR-2 works by exploiting the optical properties of mineral components within lunar soils. Like a leaf that absorbs all colours of the rainbow except green, minerals absorb specific wavelengths of sunlight which are not reflected back into space. In order to find these characteristic gaps SIR-2 splits the reflected lunar light into is components, like a prism resolving sunlight into a rainbow. The missing wavelengths give indications as to the mineralogical composition of the Moon's surface.

Since the characteristic 'colours' of the main minerals found throughout the solar system lie beyond red in the longer wavelengths called infrared, SIR-2 is optimized to work with these wavelengths. SIR-2 is the product of an on-going research and application programme at MPS aimed at developing and producing state-of-the-art and an increasingly sophisticated range of spectrometers operating in the visible to near infrared.

All in all, eleven scientific instruments are part of the Chandrayaan mission. Five of them were built in India; the others were developed by

international research teams. Apart from the mineralogical mapping of the lunar surface, other scientific aims include a high-resolution, three-dimensional map of the lunar topography as well as locating and confirming the presence of ice. Past missions have already found evidence for ice on the banks of certain craters in the polar regions.

The development of SIR-2 was made possible by funding by the Max Planck Society and ESA and represents the growing relationship between the Max Planck Society and India. As a sign of this esteem, scientists from MPS were the first foreign researchers that were allowed to calibrate their instrument in India.

Provided by Max Planck Institute for Solar System Research