Scientists develop a new sensor for future missions to the moon and Mars

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A team of scientists from the Faculty of Physics of Lomonosov Moscow State University and their colleagues developed a compact spectral polarimeter for carrying out mineralogical investigations on the surfaces of astronomical bodies. The description of the device and the results of prototype testing were published in *Optics Express*.

Spectral imaging, measuring spectral characteristics for each separate point of an object, is a widely used method for studying the surfaces of astronomical bodies. Spectral polarimetry gives important extra information about the structure and composition of rock. Scientists use this technique to find out how the light propagation direction (polarization plane) changes when the light goes through a mineral.

"The scientific value of this work lies in the creation of a compact and light spectral polarimeter that could be easily installed on a Mars or moon rover," explained Sergey Potanin, a co-author of the article and associate professor at MSU.

In the course of their work, the scientists developed a spectral polarimeter that operates in the near-infrared range. Based on its own calculations, the team created a lab prototype and tested it on two minerals (plaster and kaolinite) simulating the surfaces of the moon and Mars. The authors of the article hope that in the future similar spectral polarimeters will be used as prospecting tools on planet rovers.

The new device is smaller than its earlier analogs. This became possible

due to a new compact optical scheme that picks up two images at the same time in two perpendicular polarization planes.

"The main result of our work is development and creation of a prototype spectral polarimeter for mineralogical investigations. This device might be used during future missions to Mars or to the moon," added Sergey Potanin.

More information: Denis A. Belyaev et al, Compact acousto-optic imaging spectro-polarimeter for mineralogical investigations in the near infrared, *Optics Express* (2017). DOI: 10.1364/OE.25.025980

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