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DEVELOPMENT OF THE SCIENCE INSTRUMENT CLUPI: THE CLOSE-UP IMAGER ON BOARD THE
EXOMARS ROVER

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Number of the topic selected: 1
Oral presentation or poster session

First mission of the Aurora Exploration Programme of ESA, ExoMars will demonstrate key flight and in situ enabling technologies, and will pursue fundamental scientific investigations. Planned for launch in 2013, ExoMars will send a robotic rover to the surface of Mars.

The Close-UP Imager (CLUPI) instrument is part of the Pasteur Payload of the rover fixed on the robotic arm. It is a robotic replacement of one of the most useful instruments of the field geologist: the hand lens. Imaging of surfaces of rocks, soils and wind drift deposits at high resolution is crucial for the understanding of the geological context of any site where the Pasteur rover may be active on Mars. At the resolution provided by CLUPI (approx. 15 micrometer/pixel), rocks show a plethora of surface and internal structures, to name just a few: crystals in igneous rocks, sedimentary structures such as bedding, fracture mineralization, secondary minerals, details of the surface morphology, sedimentary bedding, sediment components, surface marks in sediments, soil particles. It is conceivable that even textures resulting from ancient biological activity can be visualized, such as fine lamination due to microbial mats (stromatolites) and textures resulting from colonies of filamentous microbes, potentially present in sediments and in palaeocavities in any rock type.

CLUPI is a complete imaging system, consisting of an APS (Active Pixel Sensor) camera with 27° FOV optics. The sensor is sensitive to light between 400 and 900 nm with 12 bits digitization. The fixed focus optics provides well focused images of 4 cm x 2.4 cm rock area at a distance of about 10 cm. This challenging camera system, less than 200g, is an independent scientific instrument linked to the rover on board computer via a SpaceWire interface. After the science goals and specifications presentation, the development of this complex high performance miniaturized imaging system will be described.