

# **PRELIMINARY RESULTS OF THE MAGNETIC PROPERTIES EXPERIMENTS ON THE MARS EXPLORATION ROVERS, SPIRIT AND OPPORTUNITY**

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Spirit and Opportunity each carry a set of Magnetic Properties Experiments to investigate the properties of the air-borne dust in the Martian atmosphere. The goal of the magnetic properties experiments is to provide information on how the dust once formed. The objectives are: a) To identify the magnetic mineral(s) in the dust, soil and rocks on Mars. b) To establish if the magnetic material is present in the form of nanosized possibly superparamagnetic crystallites embedded in the micrometer sized airborne dust particles. c) To establish if the magnets are culling a subset of strongly magnetic particles or if essentially all particles of the airborne dust are sufficiently magnetic to be attracted by the magnets. d) Detect compositional differences between the airborne dust and the soil and rock sites which are investigated at two landing sites.

Two large magnets (called Capture and Filter magnet) are located such that the attracted dust can be studied by the Panoramic Camera (Pancam), the Mössbauer Spectrometer, the Alpha Particle X-ray Spectrometer (APXS), and the Microscopic Imager (MI). The dust settles on a circular surface of high purity aluminium (45 mm in diameter), where the central part (25 mm in diameter) is magnetically active. The Capture magnet was designed to be as strong as possible, whereas the strength of the Filter magnet was chosen such that it attracts mainly dust particles with high magnetic susceptibility (hence the name “filter magnet”).

A so-called Sweep Magnet experiment is placed near the Pancam Calibration Target. The purpose of the Sweep Magnet experiment is twofold: 1) to try to detect if any non-magnetic minerals are present in the atmospheric dust in any significant amount. 2) to provide a magnetically attracted dust layer suitable for spectroscopic investigation by the Pancam spectroscopy band pass filters.

Each rover carries a Rock Abrasion Tool (RAT) on the robotic arm (IDD), which can be used to remove dust (by brushing) and weathering products (by grinding) from Martian rocks. Four RAT magnets are placed inside the RAT behind the grinding tool and the small brush. The amount and colour of dust produced during grinding that sticks on the RAT magnets are being observed before and after grinding.

A summary of the results of these experiments will be presented at the Assembly.