ESRF	**Experiment title:** Micro-diffraction analysis of Interplanetary Dust Particles	**Experiment number**: ME-1023
Beamline: ID 13	**Date of experiment**: from: 11. Sept. 2005 to: 13. Sept. 2005	**Date of report**: 28. February 06
Shifts: 6	**Local contact(s)**: Manfred Burghammer, ESRF Christian Riekel, ESRF	*Received at ESRF:*

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Report:

Introduction:

The Earth's surface is constantly being rained upon by interplanetary dust particles (IDPs), from a few to several hundred micrometers in diameter. The size distribution of this dust peaks at around 200µm. This dust is thought to be derived from collisions of asteroidal material and from comets and can be found in meteorites and is collected by aircrafts in the Earth's stratosphere. IPDs have preserved materials, which predate the formation of the Solar System. It is commonly believed, that most IDPs are chemically, mineralogically, and texturally primitive in comparison to meteorites. An exact distinction between terrestrial and extraterrestrial source of the dust particles can be performed by determination of the Mg/Si and Si/S/Fe/Ni elemental ratios. The most common minerals found in IPDs are Fe-Mg-silicates (olivines, pyroxenes and hydrous phyllosilicates), iron alloys and iron containing sulfides (troilite/pyrrhotite). However, the small size of the IDPs poses a problem for the most common chemical, structural and petrographic analytical techniques. Therefore, we performed X-ray micro-diffraction on several IDP in order to derive the mineral phases in single grains.

Experimental:

X-ray diffraction patterns were collected at the beam line ID 13 using a marCCD detector and a beam size of about 0.8 µm. Several interplanetary dust particles were investigated with sizes between 5 µm and about 1 µm. The in silicone oil embedded particles, to prevent oxidation, were mounted on Kapton foil. A grid with a size 1 µm x 1 µm was used to map the particles. We collected diffraction pattern at each point of the grid (Fig.1). To minimize the effect of preferred orientation, patterns were collected at different particle orientations.

Preliminary Results:

At the current stage of the data evaluation, we were able to identify the most abundant mineral phases in some particles. These are Pyroxenes with various Mg/Fe rations and troilite (FeS). Currently, Raman spectroscopy and micro Secondary Ion Mass Spectrometry measurements are performed on the particles in order to collect additional information about the composition and mineral phases. We are confident, that the combination of these techniques will allow us to determine the complete mineral phase content of the IDPs.

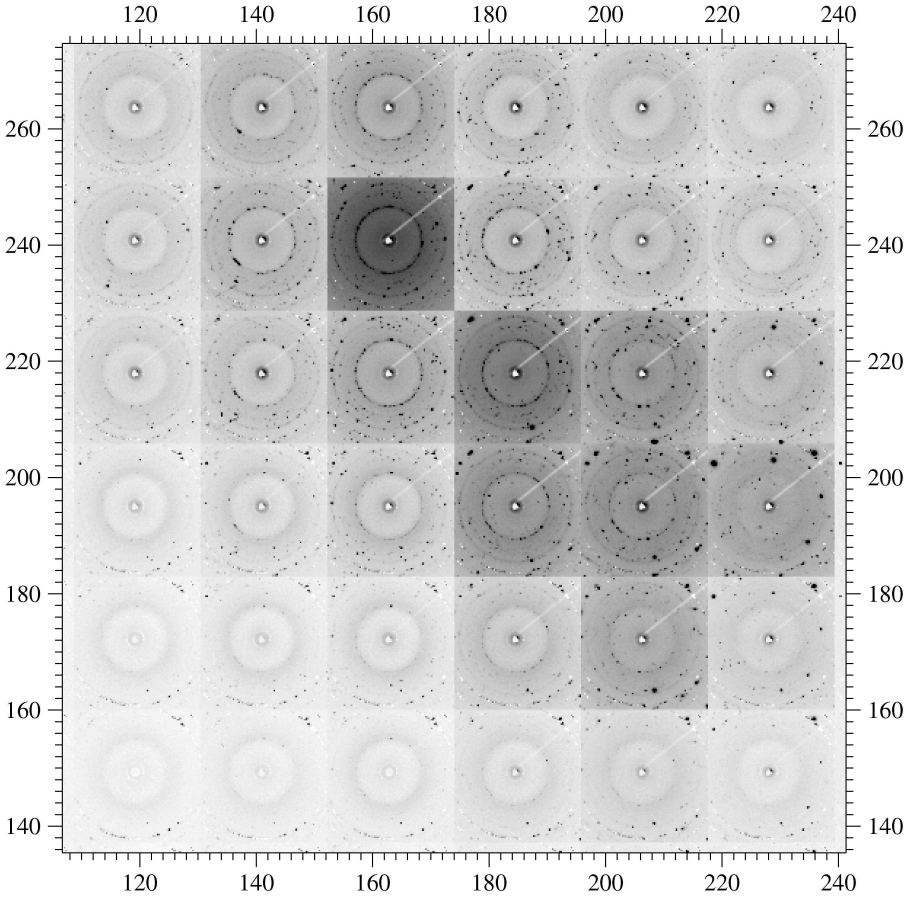

Figure 1 *Composite image of collected diffraction patterns during a scan over one particle.*