The COSIMA Instrument

**COSIMA Functional Principle**

Indium Ion Source (Clean)
Primary Ion Beam
Secondary Ion Beam
Ion Detector
Drift Tube
Tungsten Needle
Cometary Dust
Target (Chemistry Station)
Camera
Target (Collection Position)
Target Store
Robotic Arm with Target (Spectrometer Pos.)
Sensors
Motors
Start
TDC
(TDC−TDC, −DAC, −PTC, −TRIG) (CPU)
DET−HVC
(BS−HVC)
Heater Supply

**COSIMA Block Diagram**

**The COSIMA Team**

The von Hoerner & Sulger GmbH is prime contractor and responsible for the overall design, management, production, and qualification testing.

The Max-Planck-Institut für extraterrestrische Physik (MPE), Garching, Germany, then with Director Prof. G. Haerendel, hosted the PI Dr. Jochen Kissel, who contributed TMJ and mechanical systems.

The Bergische Universität and Gesamthochschule Wuppertal (BUGH) participated in developing the data acquisition unit TDC.

The Finnish Meteorological Institute (FMI), Helsinki, Finland, provided the GSE and the COSIMA flight software.

The Ingenieurbüro Dr. Franz Krueger, Darmstadt, Germany, provided cleanliness analyses, scientific methods for spectra interpretation, and developmental effort for collector targets.

The Institut d’Astrophysique Spatiale (IAS), Orsay, France, developed the COSISCOPE camera and the power converters.

The Österreichisches Forschungszentrum Seibersdorf, Austria, provided the Primary Ion Source (IPS).

The Institut für Weltraumforschung (IWF), Münster, Germany, provided the Primary Ion Optics (PIBS).

The Laboratoire de Physique & Chimie de l’Environnement (LPCE), Orléans, France, contracted the primary ion optics (PIBS).

The Universität der Bundeswehr, Neubiberg, Germany, provided collector targets.

The Max-Planck-Institut für Planetologie, Münster, Germany, performed TOF-SIMS analysis of analogs for scientific and instrumental comparison.

The Max-Planck-Institut für Aeronomie (MPAe), Kallenburg-Lindau, provides science operations.

**COSIMA Timeline**

1992 ESA performs Pre-Study for new Cometary Mission "ROSETTA".
Dr. J. Kissel, MPE Heidelberg, presents dust mass spectrometer concept based on CoMA/CRAF (NASA mission, canceled).
Sep. 1993 ESA selects ROSETTA as new "Cornerstone Mission."
June 1994 Dr. Kissel contacts institutes for contributions, prepares exp. proposal "COSIMA" to ESA.
Summer 1996 vH&S starts development of COSIMA eng. model.
1998 vH&S receives contract for the COSIMA flight model.
July 2002 vH&S delivers the COSIMA flight model (XM) to ESTEC.
Jan. 2003 ROSETTA launch (Kourou) postponed by ESA.
July 2003 COSIMA emitter maintenance session at GSC, Kourou.
26 Feb. 2004 Planned launch date.

**COSIMA Measurement Principle**

• Cometary dust is collected on targets, which are stored in Target Manipulation Unit (TMU).
• The dust grains are located by microscopic camera COSISCOPE.
• A pulsed primary Indium ion beam partially ionises the dust grains.
• The secondary ions (pos. or neg., selectable) are accelerated by electrical fields, and travel well-defined distance through drift tube and ion reflector.
• A multipurpose plate with dedicated amplifier is used to detect the ions.
• The arrival times of the ions are digitised and accumulated into 2 ns bins.
• The mass spectra are calculated from the time-offlight spectra.

**The COSIMA Investigation**

COSIMA has been proposed, developed, and delivered by an international team of 19 investigators. The PI Jochen Kissel (MPE) and 4 CoPIs Tetsu Langenau (IAS), Rita Schulz (ESTEC), Johan Søløe (FMI), and Hanna von Hoerner (vH&S) are leading the investigation. Funding comes from DARA/DLR and the respective other national agencies. The special support by ESTEC in a critical situation before delivery is gratefully acknowledged.

**COSIMA Contact, Links**

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MPAe Homepage http://www.mpe.mpg.de

MPE Homepage http://www.mpe.mpg.de

FMI COSIMA Homepage http://www.geo.fmi.fi/PLANETS/Cosima.html

ROSETTA Homepage http://rosetta.esa.int

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