MPI Halbleiterlabor on the track for developing detectors for X-Ray telescope eROSITA - German Aerospace Agency DLR contributes 21 million Euros project funding

eROSITA approved

Munich, April 1st, 2007 **– The German aerospace center DLR has approved a 21 million Euro funding to build the German eROSITA X-ray telescope for a launch in 2009. The DLR and the Russian space agency ROSKOSMOS signed a memorandum of understanding for the project cooperation. The science funding for the MPI Halbleiterlabor and the Max-Planck-Institut für extraterrestrische Physik (MPE) is secured with immediate effect. The development of the X-ray detectors for the CCD-cameras (Charge Coupled Devices) is given the final go-ahead.**

You don't see it, you don't feel it – but still it is powerful enough driving the universe apart: It's all about the Dark Energy. And it's about the mysterious yet unexplored matter that the X-ray telescope eROSITA (extended Roentgen Survey with an Imaging Telescope Array) will be searching from 2011 on: The first imaging all-sky survey in the medium energy X-ray range up to 10 keV will be performed with an unprecedented spectral and angular resolution. The international cornerstone project was additionally enabled by a memorandum of understanding between the German Space Agency DLR (Deutsches Zentrum für Luft- und Raumfahrt) and the Russian space agency ROSKOSMOS signed in March 2007. Including eROSITA, a variety of astrophysical instruments will be launched into orbit on board the Russian spectrum-Roentgen-Gamma (SRG, or spectrum-X-Gamma) satellite in 2009.

eROSITA's Eyes
Based on successful missions, such as the European XMM-Newton satellite or the United State's still operational Mars Rovers Spirit and Opportunity on Mars, the MPI HLL is constantly developing the world's most sensitive X-ray detectors. As a result a novel detector system for eROSITA's CCD-camera including control and readout electronics is currently being developed in a close cooperation with the MPE. The pnCCD detector prototyped by MPI HLL measures 2 cm by 2 cm, it is read out by two 128-channel CAMEX analog signal processors and mounted and connected on a ceramic multi-layer printed circuit. While various tests with the prototype detectors are being carried out, the MPI HLL has commenced the production of the flight pnCCD wafers and CAMEX readout chips.

The X-ray telescope's main components are seven mirror modules in an array (Wolter-1 type, with an aperture of 36 cm). In the focal point of each of the mirror modules there will be a camera equipped with seven dedicated focal plane pnCCD detectors (electronic "eyes"). Each mirror module will be extended to 54 nested mirror shells in order to meet the required sensitivity. The mirrors of the array will search the whole sky in parallel. From the moment the X-ray telescope is operational the seven electronic "eyes" have to be cooled at a temperature of minus 80 degrees Celsius.

Scientific Payload
eROSITA is an integral part of the international scientific payload, e.g. the all-sky-monitor "LOBSTER" (GB) and the high-energy telescope "ART" (Ru). The instruments will be launched into orbit with a Soyus-2 rocket in Kourou on French Guyana in 2009. eROSITA is foreseen to be operational from 2011 on to perform the first imaging all-sky survey.

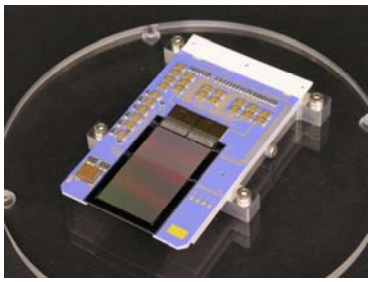
Open Up New Horizons in Astronomy and Physics
The nature of the mysterious Dark Energy that is driving the Universe apart is one of the most exciting questions facing astronomy and physics today. It may be the vacuum energy providing the Cosmological Constant in Einstein's theory of General

Relativity, or it may be a time-varying energy field. The solution could require a fundamental revolution in physics. Clusters of galaxies are the largest collapsed objects in the Universe. Their formation and evolution is dominated by gravity, i.e. Dark Matter, while their large scale distribution and number density depends on the geometry of the Universe, i.e. Dark Energy. X-ray observations of clusters provide information on the rate of expansion of the Universe, the fraction of mass in visible matter and the amplitude of primordial fluctuations that are the origin of clusters of galaxies and the whole structure of the universe.

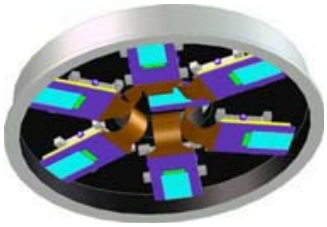
For further information

Max-Planck-Gesellschaft Press Release as of 03-30-2007:
http://www.mpg.de/bilderBerichteDokumente/dokumentation/pressemitteilungen/2007/pressemitteilung20070330/index.html

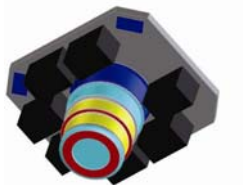
ROSKOSMOS Press Release as of 23.03.2007:
http://www.roscosmos.ru/NewsDoSele.asp?NEWSID=2130



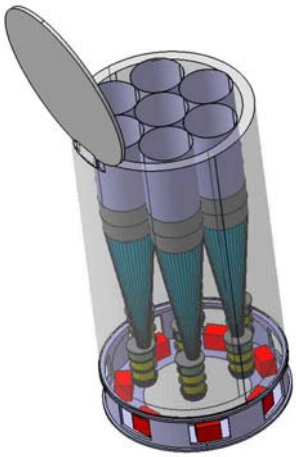
CAPTION:
Photo of a MPI HLL pnCCD detector module prototype. It measures 2 cm by 2 cm, it is read out by two 128-channel CAMEX analog signal processors and mounted and connected on a ceramic multi-layer printed circuit.



CAPTION:
Schematic view of the array of seven MPI HLL pnCCD detector modules.



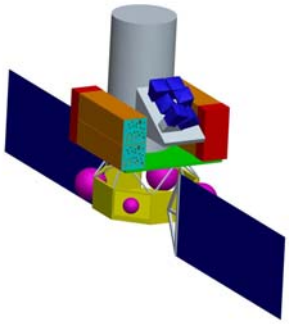
CAPTION:
Schematic view of the MPE prototype camera head.



CAPTION:
Schematic view of eROSITAs telescopes with the seven Wolter-I optics tubes (in grey) and the seven CCD-cameras' electronics boxes (in red).

CAPTION:
Schematic view of the seven Wolter-I mirror modules to be equipped with 54 nested mirror shells (in orange) and baffles. The light paths (in turquoise) pass through the baffles to strike the detectors' sensitive area.

CAPTION:
Photo of a prototype of the mirror module array. The nested mirror shells are golden shimmering beneath the star-like construction.



CAPTION:
Schematic view of the scientific payload: Grey cylindrical – eROSITA X-ray telescopes (Ger), Red-brown cubic – ART high energy telescope (Ru), Yellow – BUS on-board computer (Ru), Dark blue – solar panels, Light blue – LOBSTER monitor (wide field X-ray all-sky-monitor) (GB).

About the Max-Planck-Institut Halbleiterlabor

The Max-Planck-Institut Halbleiterlabor (German for semiconductor laboratory, abbreviated MPI Halbleiterlabor or MPI HLL) is a jointly operated research facility of the Max-Planck-Institut für Physik (MPP) and the Max-Planck-Institut für extraterrestrische Physik (MPE). We aim to develop, process and provide commercially not available state-of-the-art semiconductor radiation detectors for advanced experiments in particle physics and X-ray astronomy. Our entire silicon technology is adapted to the special requirements of semiconductor radiation detectors. Important features are in particular the ability to build wafer size defect free double sided detectors on ultra pure silicon.

We are one of the few places in the world where a monolithic integration of electronics into the detector fabrication process (signal processing, first amplification) has successfully been solved without degrading the detector performance. Our activities cover detector development as well as detector processing – from the very first detector concept followed by simulation, design, electronics implementation and testing, our technology is tailored to the special requirements of specific and challenging detector applications.

Situated at the Siemens campus in the Neuperlach district of Munich, our facilities house a class-1 clean room measuring about thousand square meters, comprising our silicon fabrication area, our mounting area as well as test facilities for electrical and spectroscopic measurements. Today about 60 physicists, engineers, technicians and students work at Neuperlach in total. They are employed by the MPP and the MPE as well as by PNSensor GmbH. The company is embedded in the overall structure by means of research agreements. Through contracts with the MPP and MPE as well as contracts with Max-Planck-Innovation, PNSensor ensures the commercial distribution of state-of-the-art sensors.

The scientific and technical staff of the MPI HLL is provided by both the MPP and MPE institutes. Apart from general funding by the Max-Planck-Gesellschaft both institutes share costs and resources equally. The directors of both institutes are responsible for the implementation of their institutes' scientific goals. These goals are transformed by the heads of the laboratory into real scientific instruments.

Academic links to Technische Universität München and Ludwig-Maximillans-Universität München as well as the University of Siegen guarantee a constant education of young professionals and their integration in the MPI Halbleiterlabor. We are currently partner in two Clusters of Excellence – one at the Ludwig-Maximilians-Universität, "Munich Center for Applied Photonics" and the other at the Technische Universität München, "Origin and Structure of the Universe".

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