XEUS – an X-ray observatory:

Project of ESA and JAXA (Japan), the sensitivity ~100 higher than that of *XMM-Newton*. Two satellites at the distance of 35 m: mirror + detector, on an orbit around L2. Launch by Ariane 5, in 2017. The energy range **0.05–50 keV**.

XEUS stands for X-ray Evolving Universe Spectrometer.

Main scientific objectives

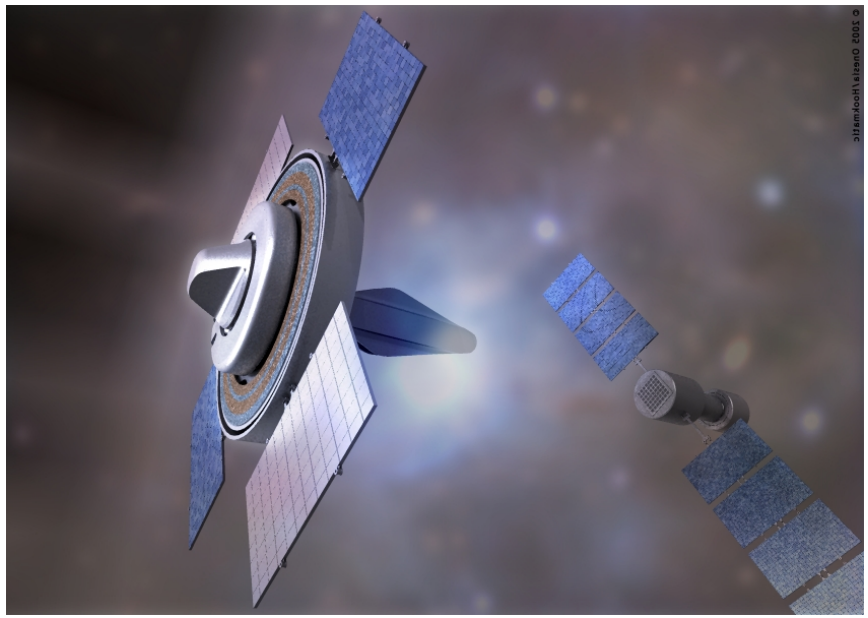
- Study the formation of first gravitationally-bound, dark-matter dominated systems and tracing their evolution to the massive clusters existing today.
- First massive black holes, their mass and spin.
- Evolution of heavy element synthesis.
- Matter under extreme conditions: neutron stars, black holes, acceleration phenomena.
- Intergalactic medium using absorption line spectroscopy.

Summary:

- Instruments: Narrow Field Imager, Wide Field Imager, Hard X-Ray Camera, High Time Resolution Spectrometer, X-Ray Polarimeter.
- Max. energy resolution 2 eV@500 eV, 5 eV@2 keV.
- Field of view 0.7 – 7′.
- Angular resolution up to 2″.

GRI: the Gamma-Ray Imager Mission

(100 keV–1.3 MeV)



Andrzej Zdziarski (CAMK), on behalf of the GRI consortium

GRI science

Exploring the unique gamma-ray sky:

Gamma-rays probe non-thermal processes

particle acceleration, particle interactions, nuclear physics

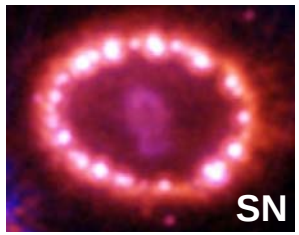
Gamma-rays are penetrating

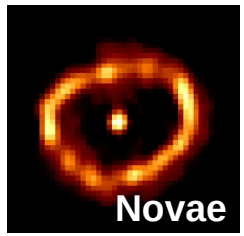
probe deep into the central engines, e.g. of supernovae or compact objects

Gamma-rays are produced in a large diversity of emission sites

Sun, compact binaries, pulsars, SNRs, Galaxy/ISM, AGNs, GRBs, CB

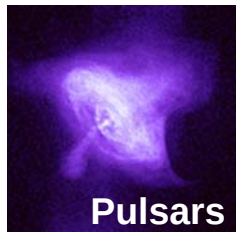
Cosmic explosions

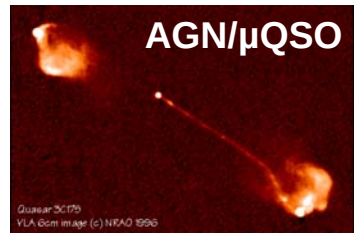


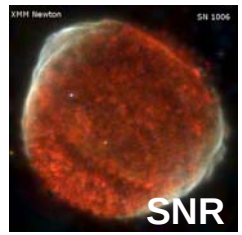


Physics of supernovae, novae, X-ray bursts, GRB

Cosmic accelerators







Physics of pulsars, compact objects, supernova remnants, Sun

GRI science requirements

Requirements for a future gamma-ray mission:

Access to non-thermal Universe and gamma-ray lines
- cover soft gamma-ray energy range (~150 keV - 1 MeV)

Sensitivity leap in soft gamma-rays
- reach 50 μCrab

Contemporaneous observation down to hard X-rays
- monitoring capability in the 20 - 200 keV band

Angular resolution for counterpart identification
- arcmin

Polarimetry for identification of emission processes

XEUS and *GRI* – Polish participation

- Participation in the *XEUS* Astrophysics Working Group and the *GRI* Science Working Group (A. Zdziarski).
- Polish hardware and software contributions planned.