# New Mission Concept: Galactic Explorer with a Coded Aperture Mask Compton Telescope (GECCO)

**Alexander Moiseev, for the GECCO team**

We present a novel concept for a next-generation γ-ray telescope that will cover the hard X-ray - soft γ-ray region. Despite the progress made by the European Space Observatory INTEGRAL, this energy range is still under-explored. GECCO will conduct high-sensitivity measurements of the cosmic γ-radiation in the energy range from 50-100 keV to ~10 MeV and create intensity maps with high spectral and spatial resolution, focusing on sensitive separation of diffuse and point-source components. These observations will enable the following major objectives for GECCO:

a) understand the nature, composition and fine structure of the inner Galaxy
b) localize and discern the origin(s) of the positron annihilation 511 keV line,
c) resolve Galactic chemical evolution and sites of explosive element synthesis
d) provide identification and precise localization of gravitational wave and neutrino events
e) test as-yet unexplored candidates for the dark matter

The instrument is based on a novel CdZnTe Imaging calorimeter and a deployable coded aperture mask. The unique feature of GECCO is that it combines the advantages of two techniques – the high-angular resolution possible with coded mask imaging, and a Compton telescope mode providing high sensitivity measurements of diffuse radiation. Expected GECCO performance is as follows: energy resolution <1% at 0.5-5 MeV, angular resolution ~1 arcmin in the Mask mode (3-4 degree field-of-view, ~2,000 $cm^2$ effective area), and 3-5 degrees in the Compton mode (~60 degree field-of-view, ~500 $cm^2$ effective area). The continuum sensitivity is expected to be ~ $10^{-6}$ MeV/$cm^2$/s at 1 MeV. GECCO can be considered for a future NASA Explorer mission.