Galactic Diffuse Emission

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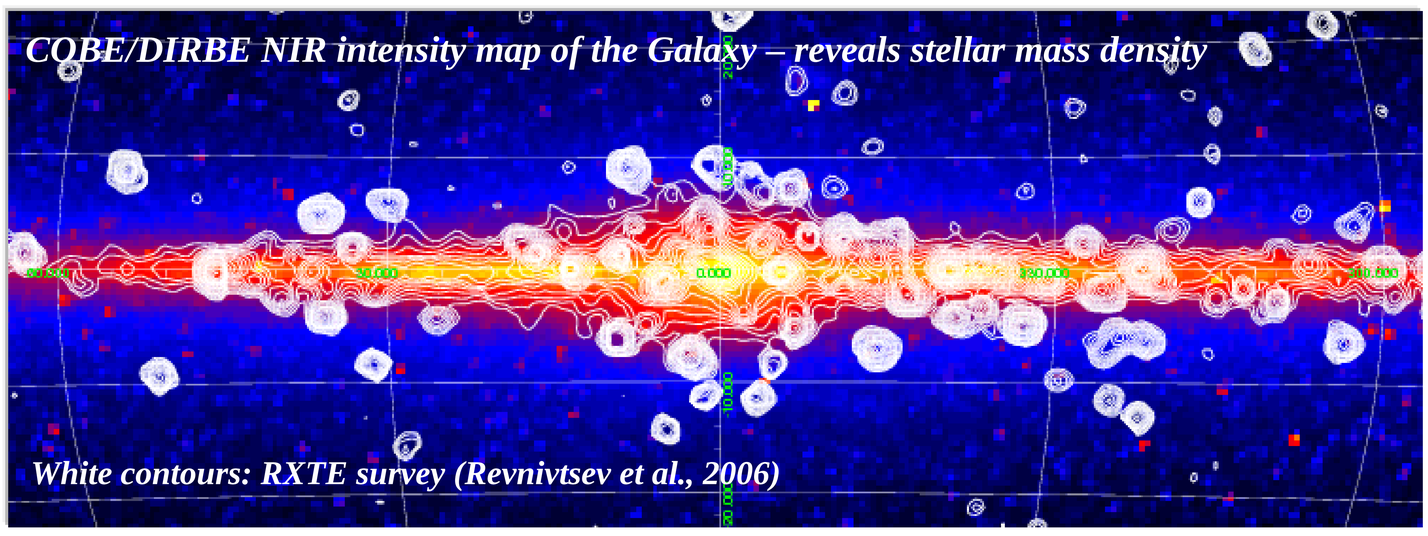
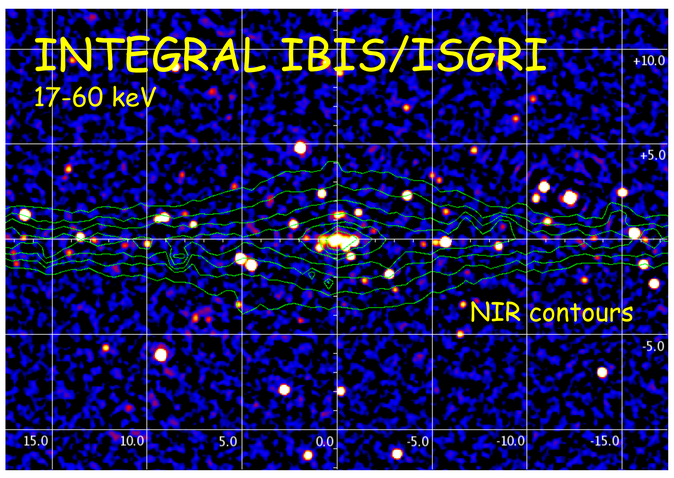
The nature of the **Galactic Ridge X-Ray Emission (GRXE)** has been under scientific debate since its discovery more than 30 years ago. It is observed as extended emission along the Galactic disk. The question was: is GRXE truly diffuse or is it composed from a large number of unresolved point sources? Using near-infrared Galaxy maps measured with the DIRBE experiment and data from the INTEGRAL observatory, we show that the galactic background in the energy range 20-60 keV originates from the stellar population of the Galaxy, which is in contrast to the diffuse nature believed before.

GRXE origin: A Paradigm shift from truly diffuse to stellar origin



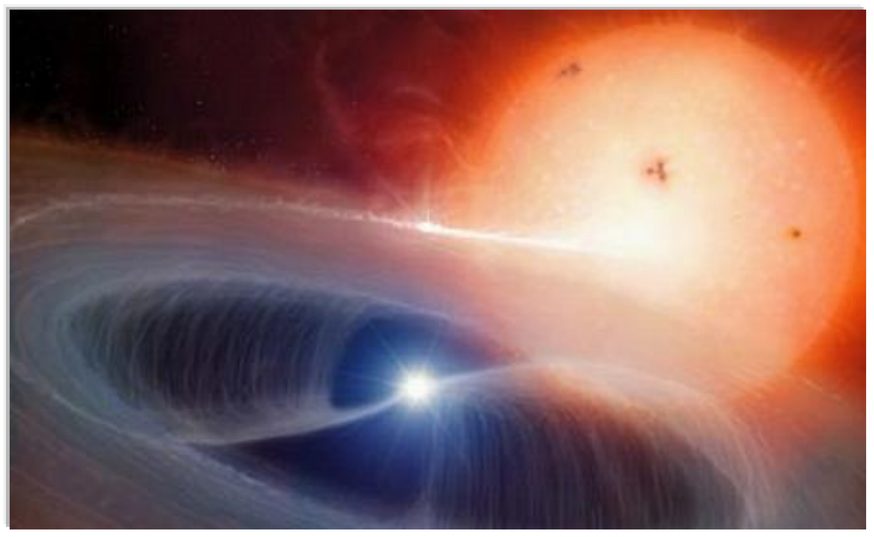
RXTE results:
- *GRXE follows near-infrared emission revealing stellar origin
- *Unit-stellar-mass emissivity is in agreement with that measured in Solar neighbourhood

Prediction:
- * Energy cut-off in GRXE spectrum depends on the mass of typical WD

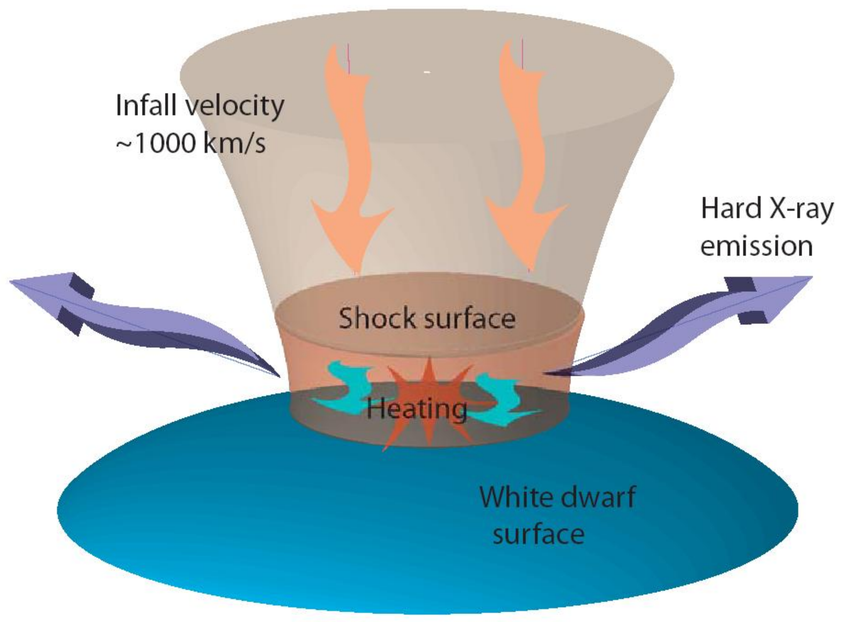


INTEGRAL observatory:

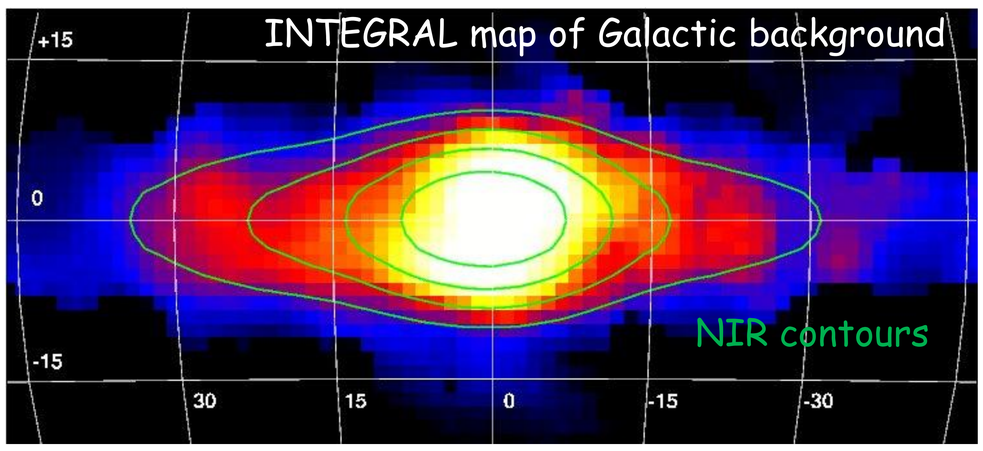
- * Large FOV (28x28 deg.)
- * Ability to subtract point sources
- * High sensitivity in 17-500 keV
- * Extensive Galactic survey
- * Dedicated observation program

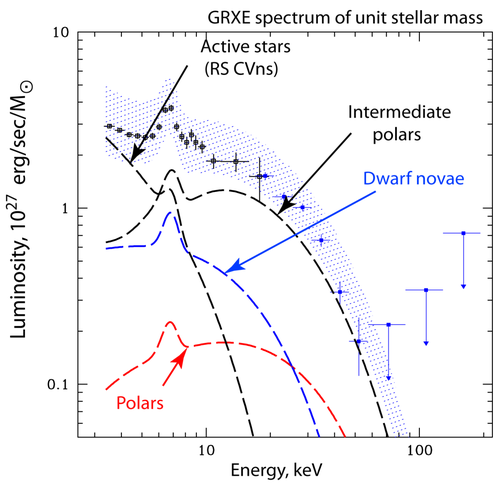


At energies above 20 keV the main contributors are accreting White Dwarfs with moderate magnetic field (Intermediate Polars, IP, see illustration above). Hard X-ray emission of such systems depends on temperature of the emitting plasma. The maximal temperature of the gas directly depends on the mass of the WD. On the plot below we show schematically accretion process in such systems. Accreting flow hits the WD surface and shock is appeared. The gas is heated up and hard X-ray emission is generated. The maximal temperature of the emitting optically thin plasma is the measure of the virial temperature of the protons near the WD surface which depends on its mass.



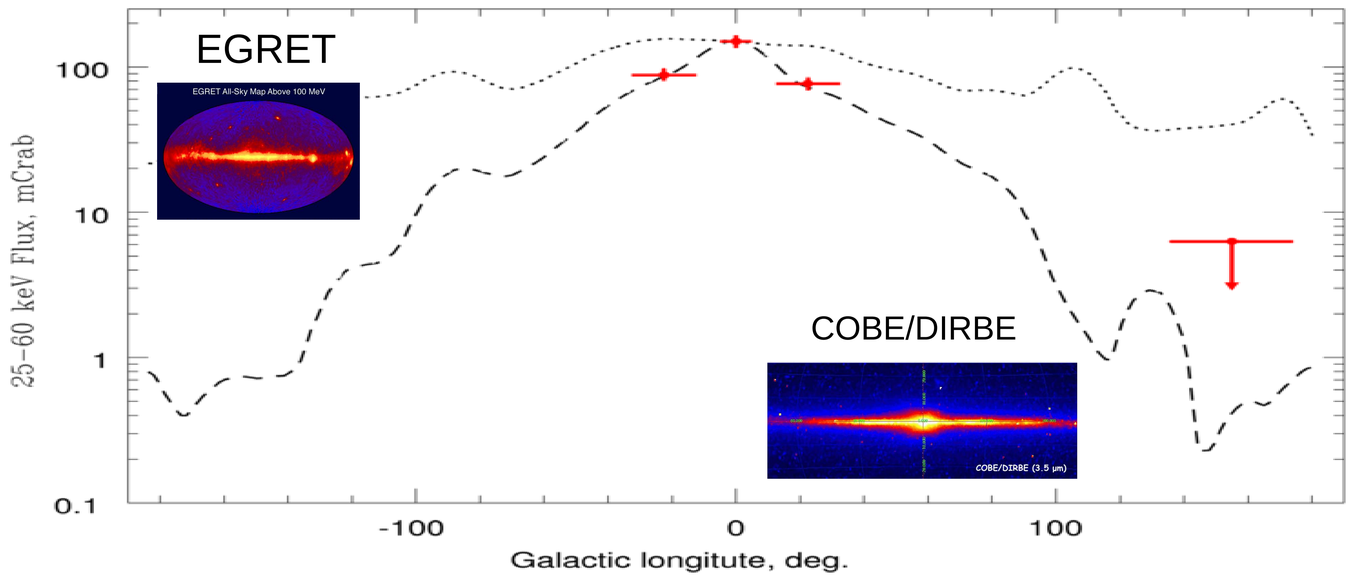
INTEGRAL confirmed RXTE results and revealed high-energy cut-off



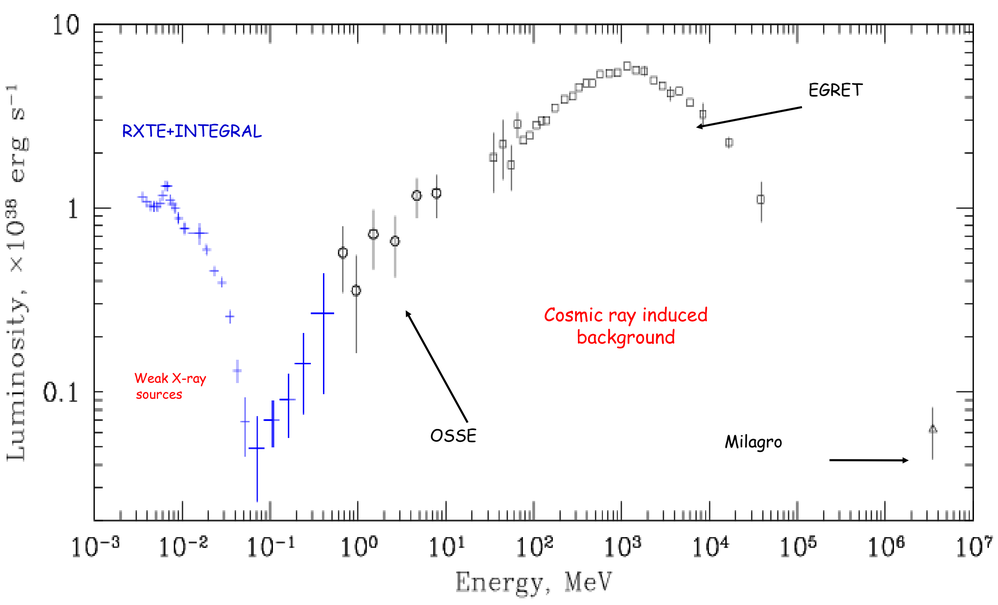


GRXE morphology above 20 keV with unprecedented accuracy

INTEGRAL observations (Galactic Latitude Scans, Krivonos et al., 2011) provide measurements of GRXE morphology with best accuracy possible. The plot below shows GRXE flux in the central part of the Galaxy, and in its Anticenter in comparison with NIR intensity (COBE/DIRBE stellar population) and EGRET map above 100 MeV (cosmic ray origin) profiles.



Schematic broad-band spectrum of Galactic background



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