

INVITED LECTURE

MeV astrophysics — INTEGRAL's heritage and COSI's future

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The soft gamma-ray range of MeV photons is notoriously difficult to analyse and interpret owing to strong instrumental background and large systematic uncertainties. Alas, measurements in this 'MeV gap' have a huge potential towards solving many of the great questions in astrophysics and cosmology.

For more than two decades, the spectrometer aboard the INTEGRAL satellite, SPI, is detecting photons from 0.02 to 8 MeV with its high-purity germanium detectors for the study of accreting compact objects, pulsars, massive star groups, and supernovae and their remnants, among others. Especially the gamma-ray lines from excited nuclei and positron annihilation serve as an invaluable messenger for stellar evolution, Galactic dynamics and feedback, cosmic-ray acceleration and propagation, as well as the dark matter phenomenon.

In this lecture, I will summarise how MeV observations work, what INTEGRAL has achieved during its 22-yr mission, and what will be possible with the next generation MeV telescope, COSI, the Compton Spectrometer and Imager, which NASA slated for launch in 2027.

