Contribution ID: **63** Type: **Oral Presentation**

Prospects for Nucleosynthesis Observations with NASA's new Gamma-Ray Mission COSI

For 20 years, the spectrometer SPI on INTEGRAL was and still is the only gamma-ray telescope to observe active nucleosynthesis in the Milky Way. The nuclear line emissions of the 26Al decay from massive stars, 22Na and 7Be decay from novae, 44Ti and 56Co decay from supernovae —all have been studied with SPI. Because of this long exposure time and steady improvements for handling the instrumental background, details in the 1.809 MeV map from 26Al along the Galactic plane towards higher latitudes emerged that could only be spectrally analysed with SPI thanks to its unprecedented spectral resolution. However, the distribution of positrons, which are the indirect proof of more beta-plus unstable isotopes in the Galaxy, follows an opposite trend: most of the annihilation radiation at 511 keV is found in the Milky Way bulge. This long-standing conundrum is difficult to solve with SPI as its sensitivity after 20 mission years will not improve significantly. In 2025, the new gamma-ray mission COSI (Compton Spectrometer and Imager) will launch, mounting 16 high-purity Germanium strip detectors in a compact design. Compton imaging can improve the sensitivity at those energies by at least one order of magnitude, potentially revealing never-seen sources in the MeV sky, such as novae, 511 keV point sources, or individual Wolf-Rayet stars in 26Al.
In this talk, I will give an overview of the latest SPI measurements in these topics, introduce the new COSI mission using examples from its prototype's balloon campaign, and show the possibilities with the future COSI satellite mission.

Length of presentation requested

Oral presentation: 25 min + 5 min questions (Review-type talk)

Please select between one and three keywords related to your abstract

Nucleosynthesis

2nd keyword (optional)

Instrumentation

3rd keyword (optional)

Astronomy

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