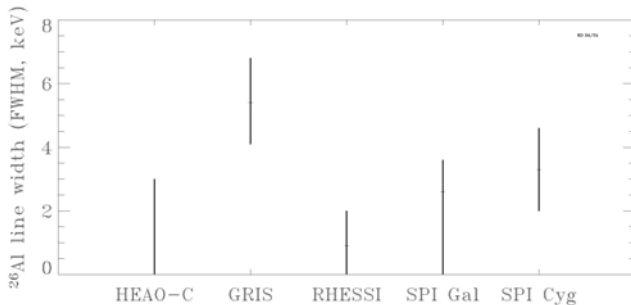


^{26}Al is an excellent tracer of recent nucleosynthesis activity in the Galaxy, with its decay time of 1.04 My. Through fine spectroscopy, we may be able to (a) measure Doppler shifts from Galactic rotation, thus disentangling source ambiguities along the line of sight, and (b) diagnose the level of turbulence in the ISM surrounding the ^{26}Al sources in different locations of the Galaxy.

The COMPTEL sky survey of gamma-rays from radioactive ^{26}Al had indicated extended emission along the plane of the Galaxy, with some structure reflecting peculiar and active regions such as the Cygnus region. Massive stars were found to dominate ^{26}Al production.

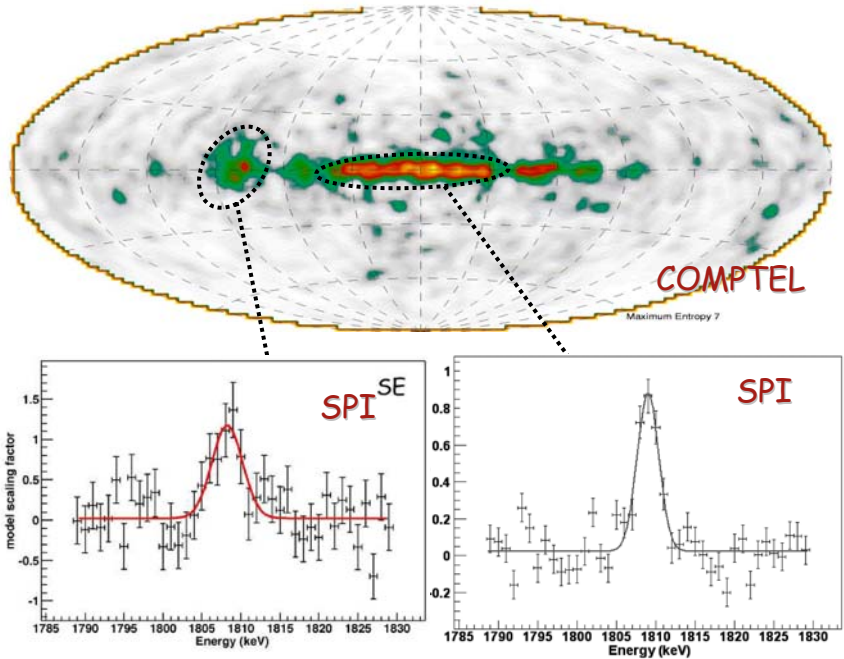
With fine spectroscopy as provided by INTEGRAL's spectrometer SPI, further diagnostics become possible: The narrow line width observed from the inner Galaxy may not hold for the Cygnus region, with its rich population of young massive stars.



Since ^{26}Al is ejected into the circumstellar environment of the source regions, its long decay time helps us diagnose how it spreads in the interstellar medium. We expect the interstellar medium morphology to differ significantly from average, in the vicinity of groups of young and massive stars.

References:

- Diehl R., Knödlseher J., Lichti G.G., A&A 411, L451 (2003), and Diehl R., ESA-SP552, in press (2004)
- Knödlseher J., Valsesia M., Allain M., et al., ESA-SP552 (in press) (2004)
- Kretschmer K., Diehl R., Hartmann D. H. : A&A 412, 47 (2004), and corresponding Fachbeirat Poster



An earlier measurement (GRIS) had reported a significantly-broadened line, corresponding to Doppler velocities of $\sim 540 \text{ km s}^{-1}$; this would imply ISM cavities of kpc size. This appears to not hold up after the new Ge detector measurements. The Cygnus region may be an intermediate case.

When we use what we know about Galactic rotation, likely distribution of nucleosynthesis sources in the Galaxy, and ^{26}Al source ejection characteristics, we can calculate expectations for the line profile. The characteristics of the ^{26}Al line (centroid energy, width) would vary along the plane of the Galaxy in its inner region (see accompanying poster by Kretschmer et al.). Comparing eastern with western regions, the expected line centroid difference would be 0.25 keV. This appears within reach of the SPI Spectrometer capabilities for the multi-year survey planned with INTEGRAL.