

## The Spectrometer SPI of the INTEGRAL mission

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INTEGRAL is ESA's high-energy astrophysics mission to be launched into a high eccentric orbit early in the next decade. One of the two mission's main telescopes is the  $\gamma$ -ray spectrometer SPI. This instrument features a compact array of 19 high-purity Germanium detectors shielded by a massive anticoincidence system. A coded aperture of the HURA type modulates the astrophysical signal.

The spectrometer system and its physical characteristics are presented. The instrument properties like imaging capability, energy resolution and sensitivity have been evaluated by means of extensive Monte-Carlo simulations. The anticipated performance for narrow-line spectroscopy is characterized by an energy resolution in the parts per thousand range, an angular resolution of the order  $2.5^\circ$  within a totally coded field of view of  $16^\circ$ , and a sensitivity of  $(5 - 8) \cdot 10^{-6} \text{ } \gamma/(\text{cm}^2 \text{ s})$  in the energy range relevant for nuclear astrophysics, i. e. from  $\sim 20 \text{ keV}$  -  $\sim 8 \text{ MeV}$ . With these characteristic features it will for the first time be possible to explore the  $\gamma$ -ray sky in greater depth and detail than it was possible with previous  $\gamma$ -ray telescopes like SIGMA, OSSE and COMPTEL. Especially the high-energy resolution will allow for the first time the measuring of  $\gamma$ -ray line profiles. Such lines are emitted by the debris of nucleosynthesis processes, by the annihilation process near compact objects and by the nuclear interaction between cosmic rays and interstellar matter. Lines of all these processes have been measured so far, but due to the relatively poor energy resolution details of the emission processes in the source regions could not be studied. With the high-resolution spectroscopy of SPI such detailed investigations will be possible. The prospects of these studies will be illuminated and the consequences of the expected findings will be judged.