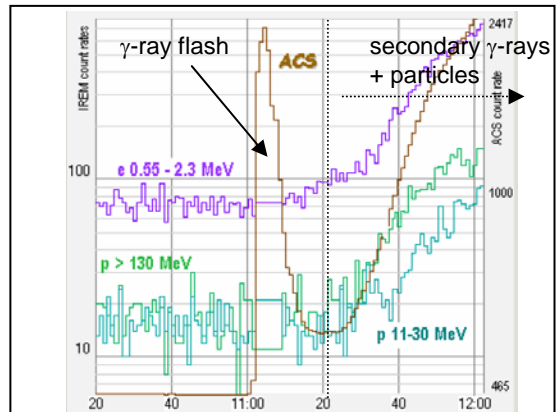
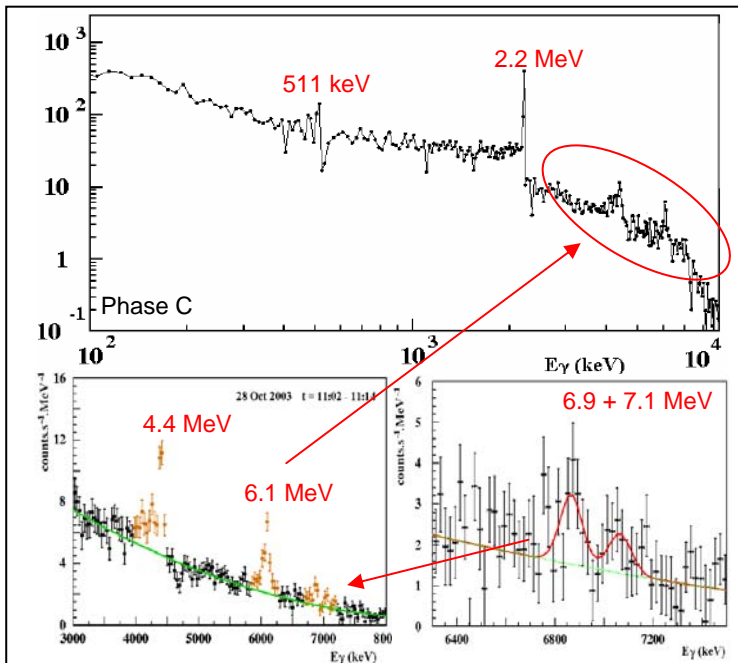




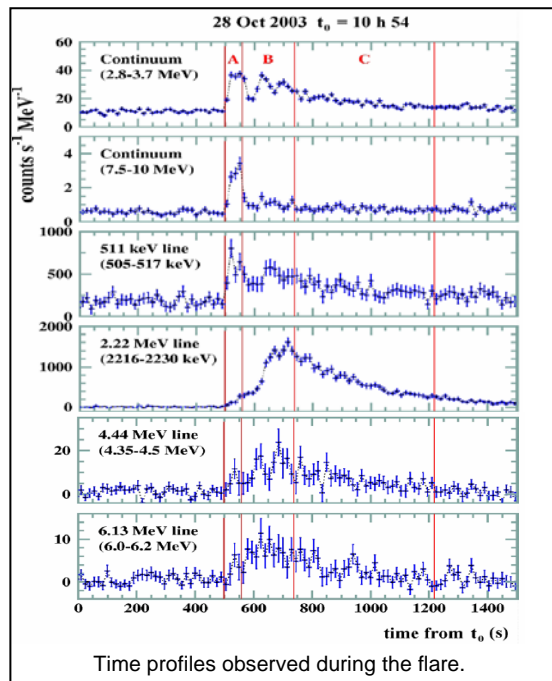
The very powerful X-class solar flare on 2003 Oct. 28 was detected by several instruments on board *INTEGRAL* as an intense flash of about 15 minutes in the hard-X and γ -ray bands. Despite the non-standard incidence of the solar γ -rays, time-resolved spectra including several nuclear γ -ray lines and a continuum at high energy were obtained with SPI. For the first time, in addition to the 2.2 MeV ^1H neutron capture line, the 4.4 MeV $^{12}\text{C}^*$ and 6.1 MeV $^{16}\text{O}^*$ nuclear interaction lines and the 6.9 and 7.1 MeV lines from $^{16}\text{O}^*$ are clearly resolved. Flux evolutions on sub-minute-scale show significant differences between lines and continuum. Several spectra have been extracted during the flare.



ACS and IREM count rates during γ -ray flare from 10:20 to 12:00 UT. The solar origin of the γ -ray flash was revealed by the strong anisotropy of the ACS counting rates



Background-subtracted spectra of SPI, recorded during the γ -ray flare. Precise line profiles on low background are obtained for the 4.4 MeV and 6.1 MeV lines. The 511 keV annihilation line is unfortunately instrument dominated. The two weaker lines emitted by $^{16}\text{O}^*$ at 6.9 and 7.1 MeV were resolved for the first time.

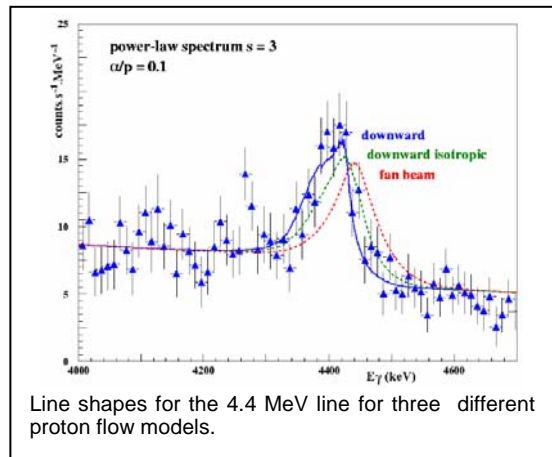


Time profiles observed during the flare.

It was possible to obtain the redshift of the 4.4 and 6.1 MeV line which is of the order of 0.6%. This is comparable with the SMM and RHESSI results. Detailed analysis of these lines could provide a new insight into the processes of ion acceleration and transport in a solar flare (figure on the right) favoured is the narrowed downward-directed distribution of accelerated particles.

References:

- Gros, M., et al. 2004, Proc. 5th INTEGRAL Workshop



Line shapes for the 4.4 MeV line for three different proton flow models.

A. v. Kienlin, R. Diehl in collaboration with M. Gros, V. Tatischeff, J. Kiener, B. Cordier, C. Chapuis, G. Weidenspointer, G. Vedrenne, A. Bykov, M. Mendez