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Transient gamma-ray emission from Cygnus X-3: AGILE observations and spectral constraints

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The AGILE satellite detected several episodes of transient gamma-ray emission from Cygnus X-3. Cross-correlating the AGILE light curve with both X-ray and radio monitoring data, we found that the main events of gamma-ray activity were detected while the system was in soft spectral X-ray states, that coincide with local and often sharp minima of the hard X-ray flux, a few days before intense radio outbursts. This repetitive temporal coincidence between the gamma-ray transient emission and spectral state changes of the source turns out to be the spectral signature of high-energy activity from this microquasar.

Finally, both leptonic and hadronic emission models for the gamma-ray activity have been tested. In particular, in the leptonic model - based on inverse Compton scatterings of mildly relativistic electrons on soft photons from both the Wolf-Rayet companion star and the accretion disk - the emitting particles may also contribute to the overall hard X-ray spectrum, possibly explaining the hard non-thermal power-law tail seen during special soft X-ray states in Cygnus X-3.

Summary

Primary author(s) : Dr PIANO, Giovanni (INAF-IAPS Roma)

Presenter(s) : Dr PIANO, Giovanni (INAF-IAPS Roma)

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