



Contribution ID: 387

Type: **Talk**

Particle acceleration in Eta Carinae: the expected and unexpected

Monday, December 14, 2015 3:25 PM (20 minutes)

The Fermi Large Area Telescope (LAT) observed for the first time ever two consecutive η Carinae periastron passages. The large field of view of the instrument, its performing sensitivity and homogeneous exposition offers a continuous observation above 100 MeV of the η Carinae region on the last 7 years. η Carinae is a binary system hosted in the Carina nebula. Its luminous blue variable and O stars emit dense and high-velocity gaseous winds that make this system a promising particle acceleration site from which very high energy γ -ray emission can be expected. No other instruments before Fermi-LAT have ever detected the high energy emission coming from η Carinae in 2 consecutive periastron passages. A maximum likelihood analysis on the recent 7-year data of the Carina region clearly detects an high energy emission above 10 GeV during both periastron passages ($> 5\sigma$) from a 95% c.l. location strongly in agreement with the nominal position of η Carinae. A spectral analysis gives faint hints of an hardening of the spectral index immediately before both periastron passages. Contrarily to the expectation that the closeness of the two stars could increase the efficiency of the outflow enhancement into particle acceleration, a temporal analysis indicates that the flux does not show a strong periodicity.

η Carinae system with its spectral variation and lightcurve represents a very good candidate to test and constraints future acceleration models for colliding wind binaries.

Collaboration

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Session Classification: 18 - Gal. accel. & pulsars