中華民國天文學會
The Astronomical Society of the Republic of China (Taiwan)

Contribution ID: **12** Type: **Oral**

Anti-correlation between Flux and Photon Index of Hard X-ray Emission from The Crab

Saturday, May 17, 2025 2:00 PM (15 minutes)

Using Swift Burst Alert Telescope event-mode data during Gamma Ray Burst occurrences, we conducted spectral analysis for the Crab system. From 38 good observations, which spans over a period of 18 years from 2006 to 2023, we found that the Crab's X-ray flux does not only flicker, but also significantly anti-correlates to its spectral power-law photon index. Since emission contribution of the Crab pulsar in this energy range is small, this anti-correlation is mainly about the emission of the Crab nebula. We suggest that this anti-correlation is an observational supporting evidence for the long-standing notion that the nebula emission is due to synchrotron radiation of shocked pulsar winds in the nebula.

Section

High Energy

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Session Classification: High-energy astrophysics