

W31a Investigating the high-energy & very-high-energy gamma-rays of the Geminga pulsar with Fermi-LAT & CTAO LST-1

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The Crab, Geminga and Vela pulsars are among the brightest gamma-ray pulsars detected so far. Fermi-LAT observations revealed that each of these three pulsars has its GeV pulse profile consisting of two peaks and a bridge between them. There are a number of candidate emission regions in a pulsar magnetosphere, and various leptonic mechanisms were proposed to explain pulsars' gamma-ray emission. Understanding the emission mechanisms for each pulsar has long been a subject of intense debates in recent years, and the currently developing Cherenkov Telescope Array Observatory (CTAO) could play an important role in this aspect. We analysed the $\gtrsim 15$ GeV gamma-ray data of the first Large Size Telescope (LST-1) of CTAO for Geminga, which have been accumulated for a total observation time > 50 hr. The LST-1 phase-folded light-curves (aka. phaseograms) of the Geminga pulsar reveal statistically significant emission ($> 10\sigma$). This complements the previously published results of Fermi-LAT and MAGIC. We also update the Fermi-LAT phaseograms with the analysis of 15.5 yrs of data. We compare the phaseograms of the Geminga pulsar among different energy bands (from hundred MeV to tens of GeV). Finally, we explore the similarities and differences between the Crab and Geminga pulsars.