

W09a Detection of the Geminga pulsar at energies down to 20 GeV with CTAO LST-1

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The bulk of emission from the Geminga pulsar is expected at tens of GeV. Out of various telescopes of the upcoming CTAO, the LSTs are the only ones with optimised sensitivity at these energies. We aim to characterise the gamma-ray pulse shape and spectrum of Geminga as observed by the first LST (hereafter LST-1) of the CTAO-North. Furthermore, this study confirms the great performance and the improved energy threshold of the telescope, as low as 10 GeV for pulsar analysis, with respect to current-generation Cherenkov telescopes. We analysed 60 hours of good-quality data taken by the LST-1 at zenith angles below 50° . Additionally, a new Fermi-LAT analysis of 16.6 years of data was carried out to extend the spectral analysis down to 100 MeV. We report the detection of Geminga at 20–65 GeV energies. Of the two peaks of the phaseogram, the second one, P2, is detected with a significance of 12.2σ , while the first one, P1, reaches a significance of 2.6σ . The best-fit model for the spectrum of P2 was found to be a power law with a photon index of roughly 4.5, compatible with the previous results obtained by the MAGIC. The joint fit with Fermi data confirms a preference for a sub-exponential cut-off over a pure exponential one, even though both models fail to reproduce the data above several tens of GeV. The overall results prove that the LST-1 is an excellent telescope for the observation of pulsars, and improved sensitivity is expected to be achieved with the full CTAO-North.