

W08a Examining the north-south symmetry of pulsars based on γ -ray phaseograms

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Fermi-LAT observations revealed that each GeV pulse profile of the Crab, Geminga and Vela pulsars consists of two peaks (P1 & P2) and a “bridge” between them. There is clearly a “bump” at the bridge phase of Vela’s pulse profiles, that could also be regarded as the third peak (P3). On the other hand, the Crab’s & Geminga’s bridges relatively resemble a “valley floor”. Despite such an apparent difference, it is interesting to investigate whether their bridge emissions are still within the same general picture as Vela’s. If the bridge of a pulsar’s phaseogram is P3, then we would expect, according to the north-south symmetry, the fourth peak (P4) to exist as well. However, such a hypothetical P4 is not intuitively identified on gamma-ray phaseograms of the Crab, Geminga and Vela pulsars. One possibility is that P4 is mixed up with and indistinguishable from other peaks, while another possibility is that our line of sight disfavours the detection of P4. For each of our targeted pulsars, we examine the relative feasibility of these two scenarios, by modelling the Fermi-LAT & IACT phaseograms. Our toy model assumes a north-south symmetric configuration, while taking into account the emission geometry, Doppler shifts, time delays as well as the spatial and spectral distributions of beams’ intensities. Based on the fitting results, we infer the locations of emission sites as well as the beam directions. Then, we interpret the essence of each emission site.