To what extent do we understand gamma-ray pulsars?

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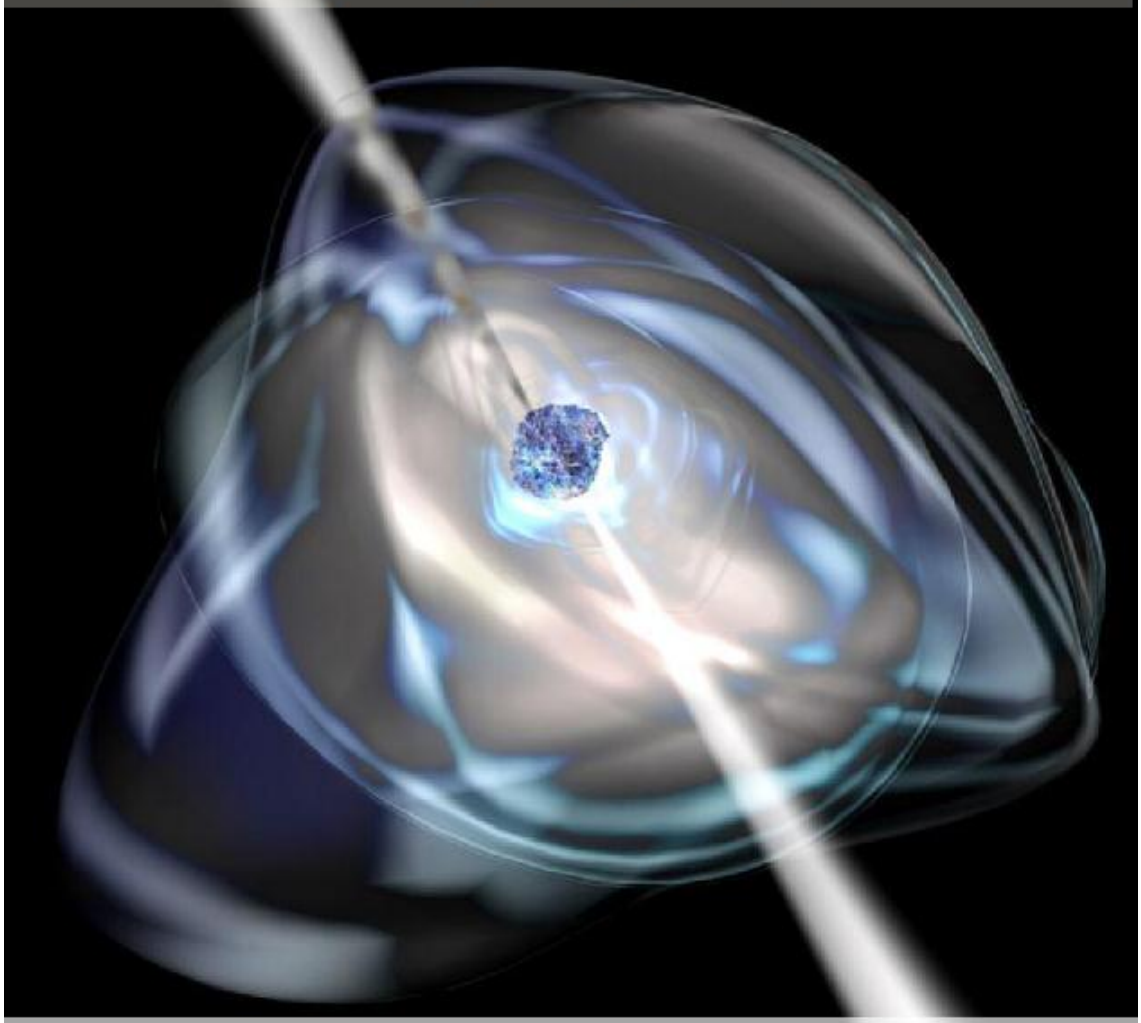

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Abstract:

The Fermi Large Area Telescope (LAT) provides a wealth of new data on isolated, rotation powered pulsars, increasing the number of detected gamma-ray pulsars from 7 to more than 88. In addition, recent ground-based observations with MAGIC and VERITAS revealed that the Crab pulsar emits pulsed signals above 25 GeV (up to a few hundred GeV). The light curves and spectral evidence obtained by these observations suggest that the gamma-ray pulsars have high-altitude emission zones whose fan-like beams scan over a large fraction of the celestial sphere. In this talk, I quantitatively examine the electrodynamics of such a high-altitude emission zone (i.e., outer gap) in a 3-D pulsar magnetosphere from the set of basic equations for the first time, and demonstrate that the second light-curve peak exhibits a harder spectrum than the first peak, which is consistent with existing LAT observations.

I will also show that my outer-gap calculations reproduce the observed gamma-ray properties (e.g., pulse profile and spectrum) of the Crab pulsar from IR to VHE.