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The effect of an offset-dipole magnetic field on the Vela pulsar's gamma-ray light curves

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Abstract content
   (Max 300 words)
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The field of gamma-ray pulsars has been revolutionized by the launch of Fermi Large Area Telescope in June 2008. Over the past six years, Fermi has detected 147 gamma-ray pulsars and measured their light curve profiles and spectral characteristics. Fermi has recently released its Second Pulsar Catalog describing the properties of some 117 of these pulsars in the energy range 100 MeV to 100 GeV. Increased statistics are enabling the discovery of a variety of light curve trends and classes. Such diversity hints at distinct underlying magnetospheric and/or emission geometries. We implemented an offset-dipole magnetic field, with an offset characterized by a parameter epsilon, in an existing geometric pulsar modelling code which already includes static and retarded dipole fields. We used these different B-field solutions in conjunction with standard emission geometries, namely the two-pole caustic (TPC) and outer gap (OG) models, and constructed phase plots and light curves for several pulsar parameters. We compared our model light curves with the newest Vela data. We refined our chi-squared method to search for best-fit light curves for each of the different models with four free model parameters, including inclination angle, observer angle, zero phase and normalization (with epsilon chosen beforehand), in order to assess the significance of our best-fit light curve and the inferred geometric parameters. Using this method, we infer the most probable configuration, thereby constraining Vela's high-altitude magnetic structure and system geometry.

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