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Modelling the high-energy emission of the Vela pulsar as synchro-curvature radiation

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In an ongoing study we interpret the curved spectrum of the Vela pulsar as seen by H.E.S.S. II (up to ˜100 GeV) and the Fermi Large Area Telescope to be the result of synchro-curvature radiation due to the acceleration of primary particles in a dissipative magnetosphere, within an extended separatrix region that leads into the current-sheet outside the light cylinder. We investigate the high-energy emission properties via energy-dependent light curve and phase-resolved spectral modelling, using the accelerating (azimuthally-dependent) electric field from global magnetospheric simulations. We expect our model to reproduce the observed trends, i.e., decrease of the flux of the first peak relative to the second one, evolution of the bridge emission, near-constant phase positions of peaks, and narrowing of pulses with increasing energy, relatively well. We will compare the predicted energy-dependent light curves and phase-resolved spectra with the observations from the Vela pulsar, expecting an improved phase lag between the radio and gamma-ray light curves upon updating the electric field description compared to our previous work.

Author: Dr BARNARD, Monica (Centre for Space Research, North-West University, Potchefstroom 2520, South Africa)

Co-authors: Prof. VENTER, Christo (Centre for Space Research, North-West University, Potchefstroom 2520, South Africa); Dr HARDING, Alice K. (Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM 58545, USA); Dr KALAPOTHARAKOS, Constantinos (Astrophysics Science Division, NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA)

Presenter: Dr BARNARD, Monica (Centre for Space Research, North-West University, Potchefstroom 2520, South Africa)

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