Modeling Very-High-Energy Emission from Pulsars

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Ground-based Air-Cherenkov telescopes have detected pulsations at energies above 50 GeV from a growing number of *Fermi* pulsars. These include the Crab, Vela, PSR B1706-44 and Geminga pulsar, with the first two having pulsed detections above 1 TeV. In some cases, there appears to be very-high-energy (VHE) emission that is an extension of the *Fermi* spectra to higher energies, while in other cases, additional higher-energy spectral components that require a separate emission mechanism may be present. We will present results of broad-band spectral modeling using global magnetosphere fields and multiple emission mechanisms that include synchro-curvature (SC) and inverse Compton scattered (ICS) radiation from accelerated particles (primaries) and synchrotron-self Compton (SSC) emission from lower-energy pairs. Our models predict three distinct VHE components: SC from primaries whose high-energy tail can extend to 100 GeV, SSC from pairs that can extend to several TeV and ICS from primary particles accelerated in the current sheet, scattering pair synchrotron radiation, that appears beyond 10 TeV. Model spectra show a wide range of VHE flux, with detectable SSC and ICS components expected for Crab-like pulsars and some millisecond pulsars but only a primary ICS component for Vela. Our models suggest that H.E.S.S.-II and MAGIC have detected the high-energy tail of the primary SC component that produces the {\sl Fermi} spectrum in Vela, Geminga and PSR B1706-44. We argue that the ICS component peaking above 10 TeV from Vela has been seen by H.E.S.S. Detection of this emission component from the Crab and other pulsars is possible with HAWC and CTA, and directly measures the maximum particle energy in pulsars.