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Concurrent spectral and light curve synchro-curvature modelling of pulsars

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In this talk I will present the current status of our development of an effective radiative model versatile enough to be applied to hundreds of pulsars. The model follows the dynamics of charged particles being accelerated in the magnetosphere of a pulsar and computes their emission via synchro-curvature radiation, with only three free effective parameters involved. The model has succeeded in fitting the gamma-ray spectra of the whole population of gamma-ray pulsars and reproduces well a majority of those pulsars that also have detected non-thermal X-ray pulsations. Complementary to the spectral model, for which we have incorporated several improvements related to the description of the acceleration region, a geometrical representation allows to build synchro-curvature emission maps from which light curves can be obtained. The sample of theoretical light curves created presents features very similar to the zoo of observational gamma-ray light curves of pulsars, in terms of morphology, number of peaks and widths of the peaks. We find a general agreement in global properties with several main conclusions: Among them 1) that the detection probability due to beaming is much higher for orthogonal rotators (approaching 100 per cent) than for small inclination angles (less than 20 per cent), 2) that the small variation in the synthetic skymaps generated for different pulsars indicates that the geometry dominates over timing and spectral properties in shaping the gamma-ray light curves.

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