

PHAROS Conference 2020: The multi-messenger physics and astrophysics of neutron stars



Contribution ID: 37

Type: **Oral Presentation**

Hybrid modeling of high-energy emission in pulsars

Tuesday 31 March 2020 11:30 (15 minutes)

We will present an iterative hybrid approach that self-consistently combines ideal force-free electrodynamics in the bulk of the magnetosphere with particle acceleration along the equatorial current sheet. We derive analytic approximations for the orbits of the particles, and obtain the structure of the magnetosphere for various values of the pair-formation multiplicity parameter. We show that realistic magnetospheres are practically indistinguishable from the ideal force-free one, and therefore, the calculation of the spectrum of high-energy radiation must be based on analytic approximations for the accelerating electric field in the current sheet, and NOT on global PIC numerical simulations.

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Session Classification: Parallel 1A

Track Classification: Emission Mechanisms