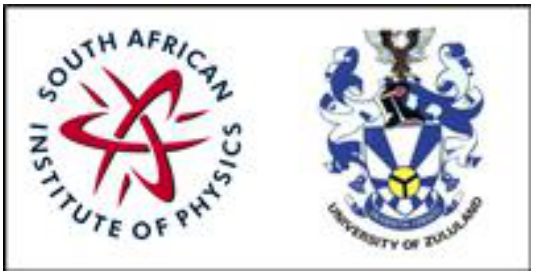

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Investigation of characteristic signals of a black-hole pulsar binary system on the grid

Friday, 12 July 2013 09:20 (20 minutes)

Abstract content
   (Max 300 words)

Binary Pulsars have been identified as important laboratories for the study of gravitational physics. In particular, binary systems comprising a pulsar and a black-hole present a scenario for the study of physics in the strong gravitational field regime. We use a numerical simulation to predict the arrival times and relative fluxs from a pulsar in a binary system. We use numerical methods to solve the set of four coupled, second order ODEs describing the general relativistic motion of a photon in the Kerr spacetime. Pulsar emission has been modelled by generating the necessary initial conditions for a large number of photons in a conical configuration. A sufficiently large number of these 'photon cones' are then used to describe a simple 'lighthouse-like' scenario, whereby the pulsar emits two conical beams in the plane of rotation. We evaluate an idealised case of a pulsar in a stable circular orbit around a significantly more massive black-hole, with the plane of rotation for the pulsar is in the equatiorial plane of the black-hole. In particular, we examine the superior and inferior conjunctions, with the hope of elucidating the theoretical behavior of a pulsar signal as seen by a distant observer.
Since the investigation is done at scale, considerable computing resources are needed for the execution and post-processing. For this reason, we report also the experience of running the investigation on the South African National Grid.

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