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Gamma-rays from accretion process onto millisecond pulsars

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We consider a simple scenario for the accretion of matter onto rotating, magnetised neutron star in order to understand the processes in the inner pulsar magnetosphere during the transition stage between different accretion modes. We analyse a quasi-spherical accretion process onto rotating, magnetized compact object in order to search for radiative signatures which could accompany the accretion process onto a millisecond pulsar close to the transition stage. It is argued that different accretion modes can be present in a single object for specific range of parameters
characterising the millisecond pulsar and the surrounding medium. We show that the radiation processes characteristic for the ejecting pulsar, i.e. curvature and synchrotron radiation produced by primary electrons in the pulsar outer gap, can be accompanied by the inverse Compton radiation produced by secondary leptons which up-scatter thermal radiation from the hot polar cap region caused by the matter accreting onto the neutron star surface. We conclude that during the transition from the pure ejector to the pure accretor mode (intermediate accretion state) additional components can appear in the γ-ray spectra of millisecond pulsars. This additional spectral component could allow to constrain the particle content of the pulsar inner magnetosphere such as the multiplicity and energies of secondary leptons.

Collaboration

– not specified –

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