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The curvature emission model of isolated X-ray pulsar RX J0420.0-5022.

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I construct a non-thermal emission theory, interpreting the observational properties of the isolated pulsar RX J0420.0-5022 in X-rays that is believed to be a thermally emitting isolated neutron star. This neutron star have previously been observed in soft X-rays to have nearly thermal spectra at temperatures , which are thought to arise from the warm neutron star surfaces. It is well-known that at a pulsar surface, the distribution function of relativistic particles is one-dimensional. However, cyclotron instability causes an appearance of transverse momenta of relativistic electrons, which as a result start to radiate in the synchrotron regime. This mechanism enables the generation optical and X-ray emissions on the light cylinder length scales. It is known, that the source spectrum is thermal. Considering a different approach to synchrotron emission theory, a spectral energy distribution was obtained, which was in a good agreement with the XMM-Newton observational data, which can be also successfully fitted with the pure Planckian spectral shape. We do not argue against the thermal emission scenario relying on spectral analysis results, as additional observational properties are acquired for distinguishing between existing emission scenarios. A fit to the X-ray spectrum was conducted using both the present synchrotron emission model spectrum absorbed by cold interstellar matter, as well as the generally assumed black-body absorption model. The work was supported by Shota Rustaveli National Science Foundation of Georgia (SRNSFG) [FR-18-14747]

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