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A joint NICER and XMM-Newton view of the "Magnificent" thermally emitting X-ray Isolated Neutron Star RX J1605.3+3249

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Thermally emitting X-ray isolated neutron stars represent excellent targets for testing cooling surface emission and atmosphere models, which are used to infer physical parameters of the neutron star. Among the seven known members of this class, RX J1605.3+3249 is the only one that still lacks confirmation of its spin period. Here we analyze NICER and XMM-Newton observations of RX J1605.3+3249, in order to address its timing and spectral behavior. Contrary to a previous tentative detection, but in agreement with the recent work by Pires et al. (2019),
we find no significant pulsation with pulsed fraction higher than 1.3% (3\sigma) for periods above 150 ms. We also find a limit of 2.6% for periods above 2 ms, despite searches in different energy bands. The X-ray spectrum can be fit by either a double-blackbody model or by a single-temperature magnetized atmosphere model, both modified by a Gaussian absorption line at ~0.44 keV. The origin of the absorption feature as a proton cyclotron line or as an atomic transition in the neutron star atmosphere is discussed. The predictions of the best-fit X-ray models extended to IR, optical and UV bands are compared with archival data. Our results are interpreted in the framework of a fallback disk scenario.

Topic

Compact and diffuse sources in galaxies and in the Galactic Center

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