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# Old neutron stars as a new probe of relic neutrinos and sterile neutrino dark matter

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We study the kinetic cooling (heating) of old neutron stars due to coherent scattering with relic neutrinos (sterile neutrino dark matter) via Standard Model neutral-current interactions. We take into account several important physical effects, such as gravitational clustering, coherent enhancement, neutron degeneracy, Pauli blocking, and weak potential. We find that the anomalous cooling of nearby neutron stars due to relic neutrino scattering is difficult to observe. However, the anomalous heating of neutron stars due to coherent scattering with keV-scale sterile neutrino dark matter could also be observed by JWST or future telescopes, which would probe hitherto unexplored parameter space in the sterile neutrino mass-mixing plane.

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