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Constraints on dense matter physics from deep heating of accreting neutron stars[1] EDWARD BROWN[2], Joint Institute for Nuclear Astrophysics, Michigan State University — Accretion of matter from a stellar companion compresses the crust of a neutron star and induces reactions that heat the interior. The temperature in the crust is set by balancing this heating with thermal radiation from the surface and neutrino emission from the crust and core. Many neutron stars accrete intermittently; when the accretion halts, the crust cools. Recent observations have now observed evidence of crustal cooling. In this talk, I present theoretical models of heating and cooling in the neutron star crust, and compare them with observations. I assess how these observations constrain the neutrino emissivity of the neutron star core. These new crust models improve on previous ones by incorporating electron captures into excited states, which increases the heat deposited into the crust. In addition, our models allow us to compute the heating in the outer crust for a wide range of possible crust compositions.

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