Abstract Submitted
for the APR21 Meeting of
The American Physical Society

The Role of Strong Gravity and the Nuclear Equation of State on Neutron-Star Common-Envelope Accretion A. MIGUEL HOLGADO, Carnegie Mellon Univ, HECTOR SILVA, Max Planck Institute for Gravitational Physics, PAUL RICKER, NICOLAS YUNES, University of Illinois at Urbana-Champaign — Common-envelope evolution is important in the formation of neutron star binaries within the isolated binary formation channel. In this channel, gravitational drag drives orbital inspiral, either leading to envelope ejection if enough energy is dissipated, or a merger with the primary's core, otherwise. Because neutron stars are in the strong-gravity regime, they have a substantial relativistic mass deficit, i.e., their gravitational mass is less than their baryonic mass. This effect causes some fraction of the accreted baryonic mass to convert into neutron star binding energy. The relativistic mass deficit also depends on the nuclear equation of state, since more compact neutron stars will have larger binding energies. We model the mass growth and spin-up of neutron stars inspiraling within common-envelope environments and quantify how different initial binary conditions and hadronic equations of state affect the post-common-envelope neutron star's mass and spin. From these models, we find that neutron star mass growth is suppressed by $\approx 15-30\%$. This work demonstrates that a neutron stars strong gravity and nuclear microphysics plays a role in neutron-star-common-envelope evolution, in addition to the macroscopic astrophysics of the envelope.

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Date submitted: 07 Jan 2021 Electronic form version 1.4