Abstract Submitted
for the APR21 Meeting of
The American Physical Society

Revealing a strong phase transition in neutron star mergers with gravitational waves[1] SEBASTIAN BLACKER, Technische Universitt Darmstadt, NIELS-UWE BASTIAN, University of Wroclaw, ANDREAS BAUSWEIN, GSI Helmholtzzentrum fr Schwerionenforschung, DAVID BLASCHKE, TOBIAS FISCHER, University of Wroclaw, MICAELA OERTEL, Universit de Paris, THEODOROS SOULTANIS, Heidelberg Institute for Theoretical Studies, STEFAN TYPEL, GSI Helmholtzzentrum fr Schwerionenforschung — Binary neutron star mergers allow us to study matter at extreme densities. Under these conditions the state of matter is currently not fully understood. As the density increases during merging, a transition from hadronic to deconfined quark matter may take place. We present a procedure to identify a strong phase transition occurring during a neutron star merger by simultaneously analyzing gravitational waves emitted before and after the coalescence of the two stars. Furthermore, our method can estimate the densities reached during the merger. This immediately places upper limits on the transition density of the hadron-quark phase transition if signs of such a transition are found. If no evidence of a transition is present, lower limits on the transition density can be inferred. Hence, a single, sufficiently accurate simultaneous detection of pre- and postmerger gravitational waves will help to constrain the onset density of the quark-hadron phase transition.

[1]Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) - Project-ID 279384907 - SFB 1245 and - Project-ID 138713538 - SFB 881 (The Milky WaySystem, subproject A10)

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Date submitted: 06 Jan 2021 Electronic form version 1.4