

Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Developing the wave equation for self-consistent metric oscillations in plasma¹ DEEPEN GARG, Princeton University, I. Y. DODIN, Princeton University, PPPL — Electromagnetic (EM) radiation has been seen to accompany gravitational-wave (GW) bursts from neutron-star mergers. However, the linear coupling between GWs and EM fields is yet to be described self-consistently with sufficient rigor. The standard approach to this problem has been to solve Einstein equations with matter and fields as source terms, but this has proven to be prohibitively cumbersome. We use an alternative, variational formulation [arXiv:2005.01256] to derive the wave equation for collective oscillations of the self-consistent metric with a general polarization. As limiting cases, we reproduce the vacuum GWs as well as the Jeans instability which is the gravitational counterpart of Langmuir waves. Developing further on this equation, we also present corrections to the geometrical optics of GWs, which are of the same order as the GW-matter interaction term for near-vacuum waves.

¹This material is based upon the work supported by National Science Foundation under the grant no. PHY-1903130.

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Date submitted: 28 Jun 2020

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