Predicted Radiation Precursors to the Collapse of Black Holes Binaries Based on Resonating Plasma Modes

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The collapse of black hole [1] binaries [2] without a following or a simultaneous emission of high energy electromagnetic radiation has led to predict [3] that this kind of emission should occur immediately before the collapse. The theoretical model on which this prediction was made involved the plasma structures which can exist around black hole binaries and sustain intrinsic plasma collective modes [2] that can have characteristic "low" frequencies about equal to the orbiting frequencies of the binary system components. As the collapse approaches, with the loss of angular momentum by emission of gravitational waves [2] from the binary system, it was suggested that resonating plasma density oscillations having the frequency of the fluctuating component of the gravitational potential involve the surrounding plasma structure. Thus the precursor to the event reported in Ref. [2], tentatively identified by the Agile X-γ -ray observatory [4], may be associated with the high energy radiation emission due to the fields produced by the excitation of the proposed plasma modes [5] and the mode-particle resonance interactions [6] that should ensue. Following that, the August 17 (2017) event identified first by the LIGO-Virgo detection of gravitational waves and featuring the inferred collapse of a neutron star binary, provided evidence of a precursor of electromagnetic emission preceding the binary collapse. *Sponsored in part by the U.S. DOE and the Kavli Foundation.

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