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Analysis of some parameters associated with binary black hole merger

P ROY CHOWDHURY[1] and S SAHOO[2]

Department of Physics, National Institute of Technology Durgapur, Durgapur-713209, West Bengal, India
[1]Email: priyankaroychowdhury27jdc@gmail.com, [2]Email: sukadev.sahoo4@gmail.com

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Abstract. Two black holes orbiting each other due to gravitational attraction can setup a binary system. Coalescence of two black holes of a binary system creates disturbance in space-time curvature which produces gravitational waves. The first experimental observation of gravitational wave signal from a binary black hole merger by the coalescence of two black holes was made by LIGO detectors at Livingston and Hanford on 14th Sept, 2015 which ensured the physical existence of black holes and binary black hole systems. In this paper, we review and estimate theoretically the angular momentum, chirp mass, energy, power of the coalescing binary systems, mass of the newly formed black hole and peak frequency of gravitational waves emitted during inspiral, merger and ring down phases for the recently observed four binary black hole merging events GW150914, GW151226, GW170104 and GW170814 by some lucid mathematical calculations.

Keywords. General theory of relativity; black hole; neutron star; gravitational wave

[Full Paper]