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Investigating the Properties of GW170729 Using a Newtonian Approximation SHARDOOL DESHPANDE, North Carolina School of Science and Mathematics — We study the gravitational wave signal GW170729 from a binary black hole system to obtain source parameters for the event. We apply a Newtonian approximation to model the inspiral stage of the coalescence (Mathur, Brown and Lowenstein 2017). We compare the efficacy of this model with the computationally intensive general relativistic model used in more complex analyses. Using data from the Laser Interferometer Gravitational-Wave Observatory (LIGO), we analyze the time-frequency evolution of the signal using a linear regression. From this regression, we obtain the key parameter of chirp mass. Using the chirp mass, we then calculate other important parameters such as the total mass of the system and the masses of the two merging black holes. We analyze the data furthermore to obtain the luminosity distance and the total energy lost in gravitational waves. We obtain a primary black hole mass of 40.9 solar masses and a secondary black hole mass of 30.2 solar masses. Our model estimates a loss of energy in gravitational waves of about 4.5 $M_{\odot}$. We calculate a luminosity distance of 1284 Mpc. All of these estimates fall within the range provided by LIGOs O1 and O2 Catalog. Finally, we discuss the limitations of the Newtonian model in comparison to the relativistic model.

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