The Average Change Of The Total Energy Of Binary Neutron Star System Due To The Emission Of Gravitational Waves With Considering Mass Variation.

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We have studied the amount of energy lost via gravitational waves emission in the presupernova binary neutron star system (SN 1987A) in a time scale of one hour before the explosion event.
We based our work on the Imshennik and Popov (1994) paper then we modified it by considering the mass variation using the famous Jeans-law($\dot{m} = -\alpha m^n$) and considering diffrent values for the constant n (from1.4 to 4.4).

Using our studied systems's data and with the aid of Mathematica programme, we get a relation between $-\frac{\mathbf{dE}}{\mathbf{dt}}$ and the eccentricity which represents the G.W emission stage.
We concluded from our curve that the sharp and maximum energy losses via gravitational waves happened at the high eccentricity values i.e. near the periastron position. Also the emission of G.W causes the orbit of the binary system to shrink until it became near circular orbit of e~0.

We have extended our study by considering the variation of one companion mass of the binary according to Jeans -law, the family of curves drawn for different n values indicates that:
For 1.4≤ n <1.47 a linear relation shows that $-\frac{\mathrm{dE}}{\mathrm{dt}}$ decreases with time τ.
For 1.47 ≤ n the curves tend to have curvature with a peak point which happens earlier as the n value increases.

Biography

Zeinab is a M.Sc. research student at Astronomy, space sciences and Meteorology department, Cairo University and a demonstrator at the same department. She had successfully completed the Pre-Master courses of mathematical Astronomy at Astronomy, Space sciences and Meteorology department, Faculty of Science, Cairo University.

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