

Gravitational Genesis of Astrophysical Jets

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ABSTRACT

It has been suggested that single and double jets observed emanating from certain astrophysical objects may have a purely gravitational origin. We discuss new classes of plane-fronted and pulsed gravitational wave solutions to the equation for perturbations of Ricci- at spacetimes around Minkowski metrics, as models for the genesis of such phenomena. These solutions are classified in terms of their chirality and generate a family of non-stationary spacetime metrics. Particular members of these families are used as backgrounds in analysing time-like solutions to the geodesic equation for test particles. They are found numerically to exhibit both single and double jet-like features with dimensionless aspect ratios suggesting that it may be profitable to include such backgrounds in simulations of astrophysical jet dynamics from rotating accretion discs involving electromagnetic fields.