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Supernova remnant evolution in uniform and non-uniform media

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Abstract content

In this work numerical simulations showing the time evolution of a supernova remnant (SNR) in an uniform and non-uniform intersteller medium (ISM) are presented. For this we use a hydrodynamic model including a kinematic calculation of the interstellar magnetic field. Important parameters include the ejecta mass and energy of the remnant, as well as interstellar medium density and adiabatic index. By varying these we constructed an analytical expression giving the return time of the reverse shock to the origin. We also computed the evolution of the remnant in non-uniform media. As the SNR evolves from one into another medium of higher density a reflection shock is created which is driven back toward the center. As the reflection shock moves inward it also drags some of the compressed ISM field lines with it and heats the inside of the SNR. When a SNR explodes in a medium with a high density and the blast waves propagate into a medium with a lower density a cavity is being blown away changing the geometry of the high density region. Also, once the forward shock moves into the medium of less density, a second reverse shock will start to form in this region.

If this papers is presented for a collaboration, please specify the collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 2 (OG part 1), pages 593-596

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