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Physics of ion acceleration in the solar flare on 2003 October 28 determines gamma-ray and neutron production

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Abstract content

Observations of gamma-rays and neutrons provide information about acceleration and transport of ions in solar flares. Neutrons from the X17.2 flare on 2003 October 28 were observed by the ground-based neutron monitor at Tsumeb in Namibia. This observation was made 5 minutes before the GLE event produced by the energetic protons. The full time history of gamma rays for this event was observed by the INTEGRAL satellite, while the RHESSI satellite observed gamma-rays during the decay phase. Gamma-ray lines at 2.2, 4.4, and 6.1 MeV were observed by both detectors, and a 2.2 MeV gamma-ray image was also obtained by RHESSI. Based on these gamma-ray line observations, we calculate predicted time-dependent neutron spectra arriving at Earth using the solar flare magnetic loop transport and interaction model of Hua et al. (2002). These spectra are then convolved with the response functions of the Earth's atmosphere and the neutron monitor to provide predicted neutron monitor count rates. We compare these predicted and observed rates to determine the accelerated ion spectrum and magnetic-loop transport properties.

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. 1 (SH), pages 41-44

Primary author(s) : Dr. WATANABE, Kyoko (Space Sciences Laboratory, University of California, Berkeley, 7 Gauss Way, Berkeley, CA 94720, U.S.A.)

Co-author(s) : Prof. LIN, Robert (Space Sciences Laboratory, University of California, Berkeley, 7 Gauss Way, Berkeley, CA 94720, U.S.A.); Dr. MURPHY, Ronald (Naval Research Laboratory, 4555 Overlook Avenue, SW, Code 7600A, Washington DC 20375-5352, U.S.A.); Dr. SHARE, Gerald (Department of Astronomy, University of Maryland, College Park, MD 20742, U.S.A.); Prof. STOKER, Pieter

(School of Physics, Potchefstroom Campus, North-West University, Private Bag X6001, Potchefstroom 2520, South Africa)

Presenter(s) : Dr. WATANABE, Kyoko (Space Sciences Laboratory, University of California, Berkeley, 7 Gauss Way, Berkeley, CA 94720, U.S.A.)

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