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GCR-induced Photon Luminescence of the Moon: The Moon as a CR Detector

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Abstract content

We report on the results of a preliminary study of the GCR-induced photon luminescence of the Moon using the Monte Carlo program FLUKA. The model of the lunar surface is taken to be the chemical composition of soils found at various landing sites during the Apollo and Luna programs, averaged over all such sites to define a generic regolith for the present analysis. This then becomes the target that is bombarded by Galactic Cosmic Rays (GCRs) in FLUKA to determine the photon fluence when there is no sunshine or Earthshine. From the photon fluence we derive the energy spectrum which can be utilized to design an orbiting optical instrument for measuring the GCR-induced luminescence. This is to be distinguished from the gamma-ray spectrum produced by the radioactive decay of its radiogenic constituents lying in the surface and interior. Also, we investigate transient optical flashes from high-energy CRs impacting the lunar surface (boulders and regolith). The goal is to determine to what extent the Moon could be used as a rudimentary CR detector. Meteor impacts on the Moon have been observed for centuries to generate such flashes, so why not CRs?

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 661-664

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