

Interplay between eclipses and soft cosmic rays

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Astronomical events such as Solar and Lunar eclipses provide the opportunity for studying the disturbance produced in the atmosphere by these events and its effect on cosmic ray intensity. There are earlier reports on decrease in secondary cosmic gamma ray (SCGR) flux during solar eclipse and enhancement of the same during lunar eclipse. We present the results from the measurement of SCGR using NaI(Tl) scintillator detectors during a total solar eclipse, an annular solar eclipse and two lunar eclipses that took place during 2017-2019. For the total solar eclipse of August 21, 2017, visible in parts of North America, our aim was to examine if there are any variation in the SCGR flux at Kolkata, India due to the occurrence of the eclipse in America. There were decrement and increment in SCGR flux in certain energy regions, which are interpreted as effects of the Travelling Ionospheric Disturbances (TIDs) during the solar eclipse in America. The annular eclipse of December 26, 2019, visible from Ooty, India provided a great opportunity to verify its direct effect on cosmic rays. We present the results from analysis of SCGR data from Cosmic Ray Laboratory (CRL) at TIFR, Ooty. We have also measured the variation of SCGR flux during the lunar eclipse of 31 January, 2018 and of 27 July, 2018, that took place in India. Both the measurements have been carried out in the Detector laboratory of Bose Institute, Kolkata, India. We observed a slight increment of SCGR during the lunar eclipse of January, whereas no significant changes during lunar eclipse of July. Details of all the measurements and the results will be presented.

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