IIA scientists trace the source of solar burst which occurred in December 2013

The study asserts that simultaneous multiwavelength observations from various vantage points are vital in revealing the origin of CMEs from the sun

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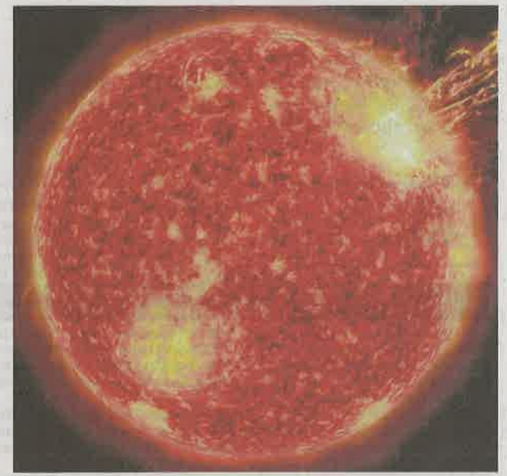
Scientists from the Indian Institute of Astrophysics (IIA) probing the evolution of a prominence eruption (PE) that occurred from the west-limb of the Sun in 2013 have traced the source of the solar burst.

Using ground-based optical and radio telescope data, as well as data from space-based satellites of NASA, scientists from IIA studied a unique PE that occurred on December 4, 2013. This could help in a better understanding of what makes space weather tick.



A representative image showing solar explosion.

"The sun often ejects plasma and magnetic fields in the form of coronal mass ejections (CMEs). These CMEs are typically associated with features on the solar disk known as filaments or prominences. The triggering mechanisms of these erupting features are of great scientific interest in determining the speed of the CME and its impact on space weather, and hence the potential harm they can cause to our satellites and communication networks when they hit the Earth," states the Department of Science and Technology.

> Generally, CMEs are accompanied by type II radio bursts due to shock-accelerated electrons, which are surprisingly not detected in this case.
>
> **SYED IBRAHIM,**
> co-author, a post-doc fellow at IIA

Prediction of the exact path of the CME through interplanetary space, and hence its effect on Earth (or geoeffectiveness), is not easy, and is a subject of intense research. Therefore, studying CMEs that were geoeffective as well as those that did not make it, are both essential to make progress.

This PE was associated with a slow CME that propagated a distance of only 40 times the radius of the Sun in the Sun's atmosphere, as well as a weak solar flare. It was found that the average acceleration of the prominence is quite small compared to strong flarse, which is why the associated CME was slower.

"Unlike the other cases of strong CMEs, an imbalance of the magnetic forces triggered this prominence eruption," said P. Vemareddy, the first author of the paper and a faculty member at the institute.

Type III bursts

In addition, this flare was also accompanied by a type of radio bursts called type III, which were recorded by the ground-based radio spectrograph from the Gauribidanur Low-frequency Solar Spectrograph (GLOSS). GLOSS is operated by IIA at the Gauribidanur Radio Observatory. "Generally, CMEs are accompanied by type II radio bursts due to shock-accelerated electrons, which are surprisingly not detected in this case," said Syed Ibrahim, a co-author and a post-doctoral fellow at IIA. The scientists found that this prominence was located in a region with weak magnetic polarities.

The study published in MNRAS asserts that simultaneous multiwavelength observations from different vantage points are very important to reveal the origin of CMEs from the sun.

"In particular, imaging observations close to the Sun are the key to determine the speed of the CME which the space payload Visible Emission Line Coronagraph (VELC) onboard the solar space observatory Aditya-L1 is going to provide soon," Mr Vemareddy said.