Rotating sunspots spin up a super solar flare

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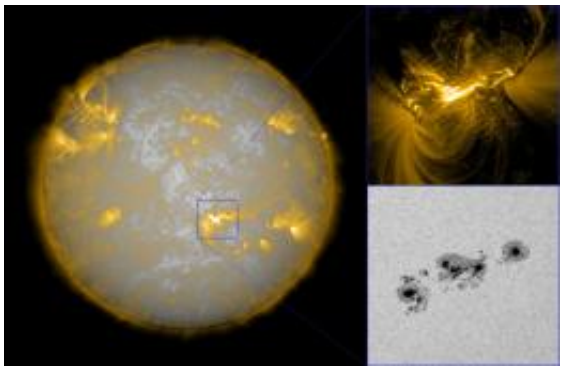

The Sun at 1.50am on 15th February 2011 using composite data of the Sun's surface from SDO/HMI and the Sun's million degree corona from SDO/AIA. The cutout region shows (bottom) the five rotating sunspots of the active region (AR 11158), and (top) the bright release of light from the X class flare. Credit: Image produced by D. Brown (UCLan). Data courtesy of NASA/SDO and the AIA, EVE, and HMI science teams.

(PhysOrg.com) -- The largest solar flare recorded in nearly five years was triggered by interactions between five rotating sunspots. Researchers at the University of Central Lancashire studied observations of the flaring region of the Sun taken by NASA's Solar Dynamics Observatory over a period of five days. Dr. Daniel Brown presented the findings at the RAS National Astronomy Meeting in Llandudno, Wales, on Wednesday 20th April 2011.

"Sunspots are features where magnetic field generated in the Sun's interior pushes through the surface and into the atmosphere," said Dr. Brown. "Twisting the Sun's magnetic field is like twisting an elastic band. At first you store energy in the elastic, but if you twist too much the elastic band snaps, releasing the stored energy. Similarly, rotating sunspots store energy in the Sun's atmospheric magnetic field. If they twist too much, the magnetic field breaks releasing energy in a flash of light and heat which makes up the solar flare."

The flare occurred at 1.44am on 15th February 2011, when the Sun released the largest recorded solar flare since December 2006 and the first flare of the current solar cycle to be classified as the most powerful "X-class". Looking at five days of SDO observations that included this flare, Dr. Brown found that the active region that flared contained five newly emerged sunspots. All five of the sunspots rotated between 50 and 130 degrees, some in a clockwise and some in an anticlockwise direction, over the five days of observations.

"Rotating sunspots are an extremely efficient way to inject energy into the magnetic field of the Sun's atmosphere," said Dr. Brown. "With five sunspots rotating at the same time enough energy has been injected into the atmospheric magnetic field to produce the largest solar flare seen for almost 5 years."

In addition to the large X-class flare, the same region also released over 40 smaller flares during the five days studied.

Provided by Royal Astronomical Society