



Observation of a reversal of rotation in a sunspot during a solar flare

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The rotation of the sunspot is regarded as a process that transfers magnetic helicity from the solar interior to the corona. It is widely known that the clockwise rotation of an upwardly directed magnetic flux tube transfers positive helicity from the solar interior into the corona, while the counterclockwise rotation transport negative helicity into corona. However, what will happen if a sunspot's rotation completely reverses? Here, we reported that the direction of a sunspot's rotation is reversed impulsively, based on observations from the Helioseismic and Magnetic Imager. The sunspot rotated counter-clockwise before an X1.6 flare but clockwise during it. Because the rapid changes in the motions at the photosphere during the flare are more likely driven by the flare than by convective flows in the solar interior, the reversal in the rotation of the sunspot is more likely resulted from the transportation of magnetic helicity from the corona to the solar interior, instead of from the solar interior to the corona.