Institute for Space Weather Sciences Colloquium

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Solar Coronal Jets and Jet-like Features: Some Recent Investigations and Possible Heliospheric Connections

Solar jets occur throughout the solar atmosphere, including in coronal holes, quiet regions, and active regions. Observations at X-ray and EUV wavelengths show that frequently jets are made by eruptions of small-scale filaments, called "minifilaments." Many, or even the majority of, these jet-producing minifilament eruptions occur at locations where opposite-polarity photosphere magnetic fluxes merge and cancel. These observations support the idea that flux cancelation builds a magnetic flux rope along which cool minifilament material often gathers, and that the flux rope subsequently erupts to form the jet through a sequence of magnetic reconnections. In this presentation we will update our recent investigations into jets. We will show how the physical processes producing jets appears to be common to solar eruptions on various size scales, from will also show how the small-scale minifilament flux ropes that we suggest erupt to form the jets could become Alvenic twist-wave packets in the solar wind, and be detected as magnetic-field "switchbacks" by the Parker Solar Probe, and we will discuss how small-scale jet-like features might contribute to the solar wind. This work was supported by NASA's Heliophysics Supporting Research (HSR) and Heliophysics System Observatory Connect (HSOC) Programs, and by the NASA/MSFC Hinode Project.

Dr. Alphonse Sterling in an astrophysicist at NASA's Marshall Space Flight Center (MSFC). He was an undergraduate at Caltech, where he took classes under Hal Zirin. He then obtained a PhD from the University of New Hampshire, working under Joe Hollweg with a thesis on solar spicules. He spent most of the next three decades between the US and Japan, working with the Yohkoh and Hinode missions, in addition to carrying out research on the solar atmosphere and solar eruptions. Since 2013 he has been located full time at MSFC, where his research has largely focused on understanding coronal jets and jet-like features.