Institute for Space Weather Sciences Colloquium

Thursday, 10th of April 2025, 11:45am ET

ECE 202 & via Zoom (meeting ID: 917 2169 7568, password: isws)

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Flux cancellation in the Solar Photosphere: What do we mean by that? And what are the consequences for the upper atmosphere?

Flux cancellation, like flux emergence, is one of the basic processes that determine the change of magnetic flux at the solar surface on a large range of spatial and time scales, from small granular-sized events to large active regions. The existence of a small scale dynamo also implies that flux will emerge continuously over the entire solar surface. This emergence will result in multiple cancellations - in addition to those that result from the random walk of already emerged flux - but also in the injection of cool photospheric material into the upper chromosphere and even lower corona with observational consequences for lines formed there. Widely studied from an observational point of view in the low atmospheric layers (photosphere and chromosphere), there are still many open questions regarding the overall 3D structure and evolution of the cancellation process, especially concerning the links of the low atmospheric layers to the overlying transition region and corona. In this talk we will concentrate on the cancellation process itself and its observational consequences as well as impact on the heating of the surrounding regions of the atmosphere. We will attempt to clearly define what is meant by cancellation, where we expect reconnection to occur and on what timeline as well as concentrate on the evolution of the magnetic field to isolate emergence and submergence processes.

Viggo Hansteen is currently a senior researcher at SETI Institute, with workplace at the Lockheed Martin Solar and Astrophysical Laboratory where he is science lead of the Interface Region Imaging Spectrograph (IRIS) mission, and in addition is working on preparations related to the Multi-slit Solar Explorer (MUSE). Most of his career, 1997 - 2019, was spent as a professor at the University of Oslo, where he specialized on constructing numerical models of the outer region of the Sun and he is one of the main developers of the Bifrost code. He has also spent time as a post-doc at the High Altitude Observatory in Boulder, CO, at the Mullard Space Science lab preparing for Hinode/EIS in Surrey, UK, and as a visiting professor at the National Astronomical Observatory of Japan, in Tokyo. His interests include coronal heating, chromospheric dynamics and the interactions between the photosphere and the outer layers of the Sun.