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How bright is the Io UV footprint?

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The electro-magnetic interaction between Io and the Jovian magnetosphere generates a perturbation in the magnetospheric plasma which propagates along the magnetic field lines and creates auroral footprint emissions in both hemispheres. Recent results showed that this footprint is formed of several spots and an extended tail. Each feature is suggested to correspond to a different step in the propagation of the perturbation and in the electron energization processes.
The present study focuses on the variations of the spots' brightness at different timescales from minutes to years through the rotation period of Jupiter. It relies on FUV images acquired with the STIS and ACS instruments onboard the Hubble Space Telescope. Since the footprint is composed of several localized features, a good understanding of the emission region geometry is critical to derive the actual vertical brightness and thus the precipitated energy flux. We developed a 3D emission model in order to assess as precisely as possible the respective contribution of each individual feature and to correctly estimate the precipitating energy flux.
As far as the brightness variations on timescales of minutes are concerned, we will present results from the high time resolution campaign executed during summer 2009. On timescale of several hours, we will show that the variation of the emitted power as a function of the location of Io in the plasma torus suggests that the Jovian surface magnetic field strength is an important controlling parameter.
Finally, the measured precipitated power and particle fluxes will be discussed in comparison with recent simulations considering both Alfvén waves filamentation and electron acceleration when the Alfvén waves become inertial.