Constraining turbulent solar flare acceleration by connecting kinetic modeling and multi-wavelength observations

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Solar flares are efficient particle accelerators. Magnetic reconnection allows huge amounts of energy to be released from the twisted and stressed magnetic fields in the Suns atmosphere. A large fraction of the released magnetic energy (10%–50%) is converted into energetic particles such as hard X-ray producing electrons. Currently, the underlying processes that efficiently energize solar flare particles are poorly constrained. Abundant solar flare observations suggest that magnetohydrodynamic plasma turbulence plays a crucial role in transferring energy released from reconnection to energetic electrons, though its properties remain largely unknown. I will discuss how recent multi-wavelength observations alongside state-of-the-art kinetic modelling may be used to constrain the properties of turbulent solar flare acceleration regions (i.e., spatial extent, spatial distribution of turbulence, velocity dependence, and acceleration timescale).