Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Observations and modeling of the onset of fast reconnection in the solar transition region AMITAVA BHATTACHARJEE, Princeton University, LIJIA GUO, BART DE PONTIEU, Lockheed Martin Solar Astrophysics Laboratory, YI-MIN HUANG, Princeton University, HARDI PETER, Max Planck Institute for Solar System Research — Magnetic reconnection is a fundamental plasma process that plays a critical role not only in energy release in the solar atmosphere, but also in fusion, astrophysical, and other space plasma environments. One of the challenges in explaining solar observations in which reconnection is thought to play a critical role is to account for the transition of the dynamics from a slow quasi-continuous phase to a fast and impulsive energetic burst of much shorter duration. Despite the theoretical progress in identifying mechanisms that might lead to rapid onset, a lack of observations of this transition has left models poorly constrained. High-resolution spectroscopic observations from NASAs Interface Region Imaging Spectrograph (IRIS) now reveal tell-tale signatures of the abrupt transition of reconnection from a slow phase to a fast, impulsive phase during explosive events in the Suns atmosphere. Our observations are consistent with numerical simulations of the plasmoid instability, and provide evidence for the onset of fast reconnection mediated by plasmoids and new opportunities for remote-sensing diagnostics of reconnection mechanisms on the Sun.

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Date submitted: 29 Jun 2020 Electronic form version 1.4