

EGU22-4064

<https://doi.org/10.5194/egusphere-egu22-4064>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Mating of two current circuits – A new type of plasma instability

Gerhard Haerendel

Max Planck Institute for Extraterrestrial Physics, Garching, Germany (hae@mpe.mpg.de)

In the context of the onset of substorms, observations had revealed the frequent occurrence of an unidentified trigger process. Inspections of such onsets had led to the discovery that high-beta plasma at the magnetosphere-tail boundary became suddenly unstable when so-called auroral streamers lined up closely with that boundary. The manifestation was the appearance of bead-like auroral structures preceding the auroral breakup and subject to nonlinear growth. Highly resolved video coverage of a few events showed that the fast moving beads moved opposite to the convective motions on either side. This led to the proposal [Haerendel & Frey 2021] that the trigger of the instability was the formation of a new current circuit, by a non-MHD process, in the gap between the two adjacent circuits of the high-beta plasma boundary and the auroral streamer. Observational evidence and a model of the current structure will be presented.