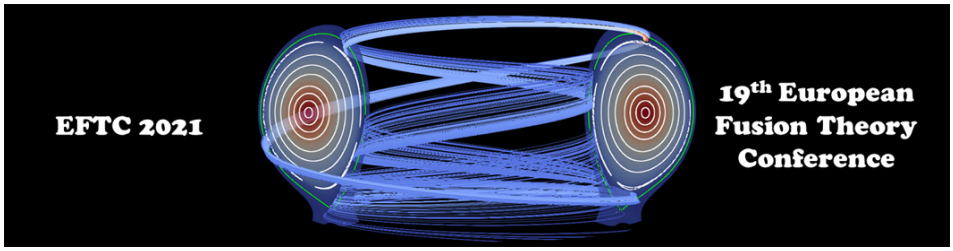

Contribution ID: **12** Type: **Oral**

Heat transport as a measure of the effective non-integrable volume

Monday, 11 October 2021 15:00 (20 minutes)

Given the large anisotropy of transport processes in magnetized plasmas, the magnetic field structure can strongly impact the heat diffusion: magnetic surfaces and cantori form barriers to transport while chaotic layers and island structures can degrade confinement. When a small but finite amount of perpendicular diffusion is included, the structure of the magnetic field becomes less important, allowing finite pressure gradients to be supported across chaotic regions and island chains. We introduce a metric for the effective volume of non-integrability based on the solution to the anisotropic heat diffusion equation. To validate this metric, we consider model fields with a single island chain and a strongly chaotic layer for which analytic predictions of the relative parallel and perpendicular transport can be made. We also analyze critically chaotic fields produced from different sets of perturbations, highlighting the impact of the mode number spectrum on the heat transport. We propose that this metric be used to assess the impact of non-integrability on the heat transport in stellarator equilibria.

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Session Classification: ORAL SESSION

Track Classification: 4. Optimization of magnetic confinement devices and 3D magnetic field effects