System studies of rf current drive for MST*

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Two rf schemes are being studied on the MST reversed field pinch for their potential in current profile control experiments. MHD modeling has shown that a substantial externally-driven off axis parallel current can improve stability of the dominant core tearing modes. A radially localized axisymmetric population of fast electrons has been observed by SXR emission during LH injection (~100kW at 800MHz), and is consistent with CQL3D modeling which predicts a small driven current. Computational work suggests that doubling the input power will statistically improve the LH-induced SXR signal to background ratio, and that about 2MW of injected power (an order of magnitude increase) will drive enough current for stabilization of tearing modes. Additionally, a 1 MW 5.5 GHz electron Bernstein wave (EBW) experiment is under construction, which utilizes a very simple and compact antenna compatible with the demands of the RFP. EBW allows access to electron cyclotron heating and current drive in the overdense plasma. Coupling of the external electromagnetic wave to the EBW has been demonstrated, and initial tests at ~100kW power have produced a small, localized xray flux consistent with rf heating and high diffusivity of fast electrons. Computational work is currently underway to answer the very important questions of how much power is required, and what level of electron diffusivity is tolerable, to generate a consequential amount of EBW current.

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