## Abstract Submitted for the DPP19 Meeting of The American Physical Society

Evidence for Electron Heat Flux - Temperature Gradient Hysteresis During Modulated ECRH Experiments on the HL-2A Tokamak YIHANG CHEN, Centre for Fusion Science, Southwestern Institute of Physics, GEORGE TYNAN, Department of Mechanical and Aerospace Engineering, University of California, San Diego, WENBIN LIU, Department of Engineering Physics, Tsinghua University, WEIWEN XIAO, Department of Physics, Zhejiang University, KAIRUI FANG, ZENGCHEN YANG, JINMING GAO, YONGGAO LI, RUI KE, LIN NIE, MIN XU, LIAN WANG, Centre for Fusion Science, Southwestern Institute of Physics, HL-2A TEAM — Here we report observation of hysteresis between perturbed electron heat flux and electron temperature gradient in modulated ECRH experiments on the HL-2A tokamak, which clearly show that the classical view that heat flux is determined by local plasma variables is violated. In the experiments, hysteresis is found to exist in L-mode plasmas under quite a few plasma conditions, including different plasma density and ECRH/NBI heating power. The electron heat flux is determined from a heat balance analysis of the core plasma using data from the multi-channel ECE, FMCW reflectometry, FIR interferometer and bolometer diagnostics, while the multi-channel ECE gives the spatially and temporally resolved electron temperature gradients. We noticed that similar phenomenon had been reported on LHD, but to our knowledge this is the first time that such hysteresis is reported in tokamaks. The behavior of density fluctuations is diagnosed by a 2D BES system as well, and some results concerning the relationship between turbulence intensity, temperature gradient and heat flux will also be presented.

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