

Plans for Electron Bernstein Wave and Electron Cyclotron Heating in NSTX*

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Electron Bernstein wave current drive (EBWCD) may enable sustained solenoid-free NSTX plasmas at $\beta > 20\%$ [1]. Electron cyclotron heating (ECH) and EBW heating (EBWH) can assist plasma startup on NSTX and provide sufficient electron heating to allow high harmonic fast wave (HHFW) current ramp up. The prospect for EBWH and EBWCD is supported by EBW emission studies on NSTX that show efficient EBW coupling for some edge conditions [2]. A ~200 kW 28 GHz ECRH/EBWH system is being installed on NSTX to support solenoid-free startup, HHFW current ramp up and initial EBW coupling and heating studies. This system will provide on-axis second harmonic ECH/EBWH in NSTX. Fundamental on-axis heating may also be possible at 15.3 GHz by operating the gyrotron in a lower order TE₀₁ cavity mode [3]. Sufficient power supply capability will be provided to support up to 1 MW of gyrotron power for future “proof-of-principle” EBWH experiments on NSTX.

- [1] G. Taylor, *et al.*, *Proc. EC-14 ECE & ECRH Workshop*, p.145 (Heliotopos Conferences Ltd., 2006)
- [2] S.J. Diem, *et al.*, this conference
- [3] T. Bigelow, *et al.*, this conference

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