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Observation of Intermittent Plasma Ejection from a Highly Overdense Spherical Tokamak Plasma Maintained by Electron Bernstein Wave Heating and Current Drive in LATE

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Non-inductive start-up of spherical tokamak (ST) is an important issue to realize compact and economical fusion reactors. In the Low Aspect ratio Torus Experiment (LATE) device, non-inductive start-up and formation of ST by electron Bernstein (EB) waves in a highly overdense regime has been explored. By injection of a 2.45 GHz microwave power of ~60 kW, the plasma current Ip is ramped up to ~12 kA and the electron density increases up to ~7 times the plasma cutoff density. Such a highly overdense ST plasma is produced by improved polarization adjustment for EB mode-conversion in the first propagation band. However, when Ip exceeds ~10 kA, Ip and the density become saturated. Intermittent plasma ejections across the last closed flux surface (LCFS) have been observed for the first time. Repetition of large ejection events causes saturation and gradual decrease of density and plasma current.

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