The Electron Bernstein Wave Heating project in the TJ-II Stellarator* A.Fernández[1], J.B.Caughman[2], A.Cappa[1], F.Castejón[1]
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TJ-II is a middle sized flexible Heliac operating in Madrid, whose plasmas are created and heated by ECRH via two 300 kW gyrotrons at second harmonic X-mode (53.2 GHz). Neutral beam injection is used for second phase heating. Since the cut off density for the 2nd harmonic X-mode (n_c=1.7 x 10^{19} m-^{3}) is reached during NBI, EBWs are considered both for providing additional heating after NBI switch on and to perform kinetic studies in high-density plasmas. Previous work has shown that the most suitable scheme for launching EBWs in TJ-II is O-X-B mode conversion, which has acceptable heating efficiency for central densities above 1.2 x 10^{19} m^{-3}, with an operating frequency of 28 GHz. In this work, the most relevant theoretical calculations are presented, including the relativistic effects both in ray trajectory and absorption, as well as the results of the optimization of the beam parameters that provide the maximum O-X conversion efficiency at the critical layer. A system based on a 28 GHz-100ms diode gyrotron will be used to deliver 300 kW through a corrugated waveguide. The microwave beam is directed and focused by a steerable mirror located inside the vacuum vessel. A diagnostic for measuring the EBW emission has been designed and tested on the bench. It uses a section of corrugated waveguide and a glass lens to focus the emission from the plasma into the aperture of a dual polarized quad-ridged horn. It will allow us to determine the EBW mode conversion efficiency, and also provides an indication of the electron temperature evolution in overdense plasmas. The status of the project and the future plans will also be presented.

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