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CRH Physics and Burn Control for the IGNITOR Experiment ALESSANDRO CARDINALI, ENEA, BRUNO COPPI, MIT — The ICRH heating in the IGNITOR experiment, among other applications, is expected to stabilize the power of the thermonuclear burning by automatic regulation of the RF coupled power. In the case where internal plasma modes may not be effective in saturating the thermonuclear instability at acceptable levels without external action, a scenario is considered where IGNITOR is led to operate in a slightly sub-critical regime by adding a small fraction of He3 to the nominal 50-50 Deuterium-Tritium mixture. The difference between power lost and alpha heating is compensated by additional ICRH heating, which should be able to increase the global plasma temperature via collisions between He3 minority and the background D-T ions. The non-linear thermal balance equation is analytically and numerically investigated for equilibrium and stability, which includes this kind of external control mechanism. The ICRH system for IGNITOR is designed to operate over a broad frequency range (80-120MHz), which is consistent with the use of magnetic fields in the range 9-13 T. The maximum delivered power ranges from 8MW (at 80MHz) to 6 MW (at 120MHz) distributed over 4 ports, and the analysis of power deposition profile is obtained by using a 2D full wave code (TORIC), which includes a Fokker-Planck solver for distribution function of the heated species.

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