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ECRH FOR W7-X: STATUS AND RELEVANCE FOR ITER

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Electron Cyclotron Resonance Heating (ECRH) is the main heating method for the Wendelstein 7-X Stellarator (W7-X), which is under construction at IPP-Greifswald. W7-X (R = 5.5 m, r_{eff} = 0.55 m) aims at demonstrating the inherent steady state capability of stellarators at reactor relevant plasma parameters /1/. W7-X is equipped with a superconducting coil system and an actively pumped divertor for 10 MW steady state heat removal. A 10 MW ECRH plant with CW-capability at 140 GHz is under construction to meet the scientific objectives. The general features of the ECRH-plant (frequency, power, CW-capability, flexibility, etc.) are of high relevance for the ITER system, although the transmission line differs from the present ITER design. The ECRH-plant is in a well-advanced state, 4 out of 10 units are completed and tested. The status of commissioning and tests is presented.
The physics background of the different heating- and current drive scenarios is briefly reviewed /2,3/. The microwave power is generated by 10 gyrotrons with 1 MW each. Series production of gyrotrons has started after the successful execution of a European R&D program. Two series gyrotrons were delivered, the first is operating at IPP-Greifswald at full specified performance (0.92 MW, pulse duration 1800 s), the second gyrotron is presently under test at FZK. An additional Gyrotron was supplied by CPI (USA) and passed the full-performance tests also successfully at IPP. The distinct microwave beams from each gyrotron are combined and transmitted to the W7-X Stellarator ports by an open quasi-optical transmission system with high transmission efficiency. The most-loaded section of the transmission-line passed integrated full power CW-tests and showed excellent performance. The microwave power is launched to the plasma by in-vessel quasi-optical plug-in launchers. The front steering system allows for wide scanning angles (< 36 deg), first cyclic tests of a mock-up were performed. The integrated test-results may provide valuable input for the ITER ECRH-plant.

/*1*/ *V. Erckmann, et al*. Proc.17th IEEE/NPSS Symp. Fus. Engin. (1997) Vol. 1, p.40
/*2*/ *M. Rome', et al*. Plasma Phys. Control. Fusion 40 (1998) 511
/3/ *H.P. Laqua, et al*, this conference