

DESIGN OF THE MAIN TRANSMISSION LINE FOR THE ITER RELEVANT LHCD SYSTEM

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A very preliminary design of the Lower Hybrid Current Drive system for ITER was developed in the early years of the 2000's. Many parameters of the system were defined on the base of knowledge and technology of those times. Experimental results obtained in the last few years, like the successful tests of a PAM launcher on FTU and on Tore Supra have definitely indicated this concept as a possible candidate for the LHCD launcher for ITER. The successful development of a prototype klystron at 5GHz with a target RF power of 500kW CW has indicated this power as an upper limit for the present high vacuum electron tubes technology at this frequency. From the physics point of view the ITER operational scenarios have been well defined, while the last experiments have pointed out the effectiveness of the LHCD waves at high plasma density.

All these results imposed a revision of the existing design of the LHCD system.

The RF power limited to a maximum of 500kW per klystron has determined a new modularity of the whole system and of the PAM launcher.

In addition a relatively shorter distance between klystrons and ITER machine suggested the possibility of using rectangular oversized waveguides, excited in the fundamental TE₀₁ mode, for the realization of the Main Transmission Lines (MTLs).

Therefore all the main microwave components of the system have been revised on these basis and different and more suitable solutions have been investigated.

In particular this paper compares the performances of the two different MTLs, based respectively on circular and rectangular waveguides, describes the main components of the proposed rectangular MTL and analyzes their main microwave characteristics.

Companion papers in this Conference cover all the other aspects of the updated design of the LHCD system for ITER.

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