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P2.015 A low power testbed for the WEST ICRF launchers and for the acceleration of their commissioning on plasma

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This paper presents a milliwatt-range testbed that has been recently designed and manufactured for the RF characterization of the WEST ICRF launchers. The low power testbed is integrated into the TITAN test facility. This extends the capabilities of TITAN from testing at high voltage/high current parts of the launchers in vacuum, to the characterization of the launchers coupling capabilities, their impedance matching and their load-resilience at low power. These pre-qualification tests allow checking the launchers performances before their installation in the tokamak which in turn allows accelerating their commissioning on plasma.

The low power testbed is an RF load based on a mechanically rigid glass aquarium which can host various mixtures such as salty-water or Barium Titanate (BaTiO3) solutions. Indeed, these high relative permittivity isotropic and homogenous dielectrics can mimic qualitatively well the magneto-plasma at ICRF frequencies for the fast wave. Hence, the S-matrix of a launcher radiating into a plasma can be qualitatively well reproduced when the launcher is facing the RF load. The aquarium is furthermore installed on linear guiding system which allows changing the antenna-load distance in a 0-100 millimeter range with an about millimeter-precision. Sweeping the antenna-load distance can be used to assess the launcher's load-resilience.

As a first step, the aquarium has been filled up with a salty-water mixture. Hands-on experiments have been conducted with a Tore Supra antenna facing the low power testbed. The optimal salt concentration, maximizing the coupling resistance, has been experimentally assessed and this optimal salt concentration has been confirmed by modeling.

Finally, the paper discusses the low-power tests of a WEST ICRF launcher and some results are detailed. In particular the launcher is tunable in the specified frequency range (48-60MHz), and even beyond, and its load-resilience has been assessed through the low-power experiments.

Presenter: HELOU, Walid (IRFM CEA-Cadarache)

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