

Developments of high CW RF power solid state amplifiers at SOLEIL

Wednesday 9 May 2012 12:00 (30 minutes)

At SOLEIL, 5 Solid State Amplifiers (SSA) are providing the required 352 MHz CW power : 1 x 35 kW in the Booster (BO) cavity and 4 x 180 kW on the 4 superconducting cavities of the Storage Ring (SR). Based on a design fully developed in house, they consist in a combination of a large number of 320 W elementary modules (1 x 147 in the BO and 4 x 724 in the SR) with MOSFET transistors, integrated circulators and individual power supplies.

After 6 years of operation, this innovative design has proved itself and demonstrated that it is an attractive alternative to the vacuum tube amplifiers, featuring an outstanding reliability and a MTBF > 1 year.

In the meantime, thanks to the acquired expertise and the arrival of the 6th generation LDMOS, SOLEIL has carried out developments which led to doubling the power of the elementary module (650 W @ 352 MHz) while improving the performance in terms of gain, linearity, efficiency and thermal stress. Four 150 kW SSA, relying on such modules, were recently commissioned in the ESRF Booster.

Now, 500 MHz amplifiers, based on this technology, are being built for ThomX (50 kW) and SESAME (140 kW) projects. All key parts have been validated.

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Session Classification: Session 4 - SSA