

ALBA RF amplifier system based on Inductive Output Tubes (IOT)

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The ALBA RF accelerating cavities are powered up to 150 kW cw at 500 MHz. This power is obtained by combining the power from two 80 kW IOTs with a cavity combiner (CaCo). CaCo is a new development, designed and built in close cooperation between CELLS and Thales Electron Devices (TED). Thomson Broadcast & Multimedia (TBM) designed the amplifier system including the power supplies and local control system.

During the system design phase for the sake of operational power margin, TED, TBM and CELLS agreed to develop a ruggedized IOT version, based on the standard IOT (TH 793) which is rated for maximum power of 80kW cw.

The new IOT version, TH 793-1, dedicated for scientific applications demonstrated cw operation up to 90 kW at 500 MHz, giving more power flexibility and the highest quality of service for the ALBA operating conditions. To keep additional reliability margin, it has been specified for 85kW cw. Technologies used in TH793-1 open the door for higher power in the future.

In association with the new IOT version, a TH18973 LS (Light Source) cavity has also been developed in order to evolve from broadcast wideband operation to single frequency. The new TH18973 LS features a 6" 1/8 coaxial RF output, an optimized cooling system and allows for centred operation at 500 MHz with 7 MHz instantaneous bandwidth and +/- 5 MHz tuning capabilities.

In parallel to the IOT design work TBM developed a new amplifier system for this application. The amplifier was developed to achieve a high reliability and performance.

Each IOT is powered by an individual power supply based on the Thomson Pulse Step Modulator (PSM) technology. The amplifier control system was designed based on a PLC controller with the possibility to interface with the Tango system used for the accelerator control.

The first amplifier system was delivered to ALBA in summer 2007 and was placed in the RF test hall and is already in use for the conditioning and testing of the first accelerator cavity. The remaining 13 amplifier systems will be delivered in summer 2008.

This presentation is giving an overview on the system design and the operation performance as measured during commissioning and cavity testing.

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