

10th ESLS RF meeting

28 September, Morning Session, 2nd part, Chairman Summary – M.Svandrlík

Thomas Westphal, “Willy Wien storage ring RF”

The Willy Wien Laboratory is part of the German Bureau of Standards. For the 48 m circumference storage ring, with an energy between 200 and 600 MeV and a electron intensity ranging from 1 electron up to 200 mA, an 80 kW 500 MHz RF system has to be provided. The power transmitter is based on a CPI IOT, rated at 80 kW, delivered few weeks ago. Its high voltage supply, built by FuG, has been already installed. The EU HOM-damped cavity has been recently connected to the power line, a 6 1/8” coaxial cable already in place, with a perfect fitting. The only major problem has been encountered with the water system: the pipes had to be redone, because of faulty welds; there is still some problem with the cooling towers. If these problems with the water are solved, the transmitter will be put into operation in November this year and the cavity conditioning will follow in December. Storage ring commissioning is expected in March 2007, operation with users in January 2008.

Marco Pedrozzi, “New Projects at PSI”

The LEG project deals with the construction of a Low Emittance Gun for the new single pass FEL facility at PSI. This is a challenging, compact facility which should reach wavelengths down to 0.1 nm. Performance and consequently costs are largely influenced by the electron beam emittance. A gun providing sufficient current (larger than 5.5 A) with small emittance (less than 0.1 mm mrad, normalized) is thus required. Two concepts have been investigated for LEG: the Field Emitter (FE) concept, easy to fabricate, but with very high current density on the tip, and the Field Emitter Array (FEA) concept, with reduced current density but more fragile and difficult to obtain. Several experiments have been performed on FEA fabricated at PSI; the learning curve of the obtained results ranges from 1 mA to few hundred mA of laser assisted emission, however the best result has been obtained with a ZrC single tip laser assisted emission, when 5.5 A have been attained; the emission is very stable. 100 kV and 500 kV test stands for high gradient pulsed acceleration are also under preparation. Overall goal is to build a 250 MeV test accelerator for 2009 and for this purpose a conceptual/technical design report shall be ready for mid 2007, including all RF issues (power sources, accelerating structures, phase and amplitude stability to 0.1 deg and 0.2% respectively, ...).

Marcos Gaspar, “500 MHz solid state amplifier – development status”

The plan is to build two solid state amplifiers, one at 500 MHz at a power rate of 60 kW for the SLS Booster RF system and another second at 506 MHz rated at 20 kW, as the amplifier for the Cyclotron Super Buncher. Given the small difference in frequency, same amplifier modules will be used; circulator and matching structures can work at both frequencies. The amplifier module will provide 250 W of power in normal operation, at a gain of 12 dB and an efficiency of 56%, while it can reach a maximum power of 280 W, at a gain of 10 dB and an efficiency of 55%. A test prototype has been built combining two such modules, for a total power of 500 W at 506 MHz, which could be attained at an input power of 30 W. An 8 way splitter at 506 MHz has also been built; its low level characterization shows the expected behaviour. A 9-way combiner has been already simulated and is going to be built. A number of different transistors have already been tested for the power module, always with good results. Schedule for the 20 kW amplifier is one year from now.

Andy Moss, “SRS and ERLP developments”

The SRS is again in operation since mid of August after a 4 months shutdown, needed to clean water contamination in one third of the vacuum chamber. The beamtube of the wiggler 9 was found full of water and had to be baked in situ. Vacuum is still recovering and the lifetime is much worse than it used to. Many water related faults are now appearing and water has become the first downtime reason at the SRS, probably due to the aging of the water pipes. Also the linac klystron, which had been operating for more than 10 years, needed to be replaced in July.

As for the Energy Recovery Linac Prototype (ERLP), the commissioning of the photocathode is in progress since July. First electrons have been seen on the first YAG screen mid of August. As for the RF system, a radical re-design of the Booster system has been performed, due to external Q issues and CW limits of the module couplers. Cavity 1 will be driven by two E2V IOTs, while cavity 2 will be driven by one CPI IOT. Booster and Linac modules will be at 2K, ready for RF tests, end of October. There were significant delays in the delivery of the cryomodels. The 4K cryogenic system was commissioned in July, while the 2K system is being commissioned right now. Energy recovery commissioning is expected in Spring 2007.