SESSION 1 – EXISTING FACILITIES, chaired by P. MARCHAND

ELETTRA *(Michele Svandrlik & Alessandro Fabris)*
The funding for the *construction of the new injector* (100 MeV LINAC & 2.5 GeV Booster) and for the *upgrade of the SR RF system* (500 MHz) has finally become a reality.
In order to increase the available power for the beam, the four existing 60 kW RF plants (12 years old, 67 000 running hours) will be progressively replaced using cavities of the 2nd generation with improved power couplers and new transmitters. The latter, which are based on the combination of two 80 kW IOT with switched power supplies, were recently ordered "turnkey" from an Italian company. The 2 next years will be quite busy and the activities will have to be precisely scheduled in order to coordinate the upgrade of the SR RF with the Booster commissioning while ensuring the maintenance and servicing of the existing SR.
The S3HC cavity (1.5 GHz) has proved to be essential for insuring the beam stability in standard user operation at 2 GeV and 320 mA. The achieved results, in terms of bunch lengthening (or shortening) and lifetime enhancement, are in perfect agreement with the theoretical previsions. The only remaining issue is the periodical failures of the frequency tuning system. While the analysis of the failures and of possible cures is going on, a single cavity is currently in use, which is enough for generating the required voltage.

SRS *(A. Moss & E. Wooldridge)*
Happy 25th birthday to SRS ! Welcome to 4GLS ! .... End of 2008, bye-bye SRS !
A significant part of the components for the *ELP (Energy Recovery LINAC Prototype)* of 4GLS is under installation and should be tested before the end of this year (DC photo-cathode gun, 100 W @ 2 K LHe cryogenic plant, IOT based transmitters, …). Recently, three Tesla type cavities were successfully tested in vertical cryostat with Qo ≈ 10^{10} at about 15 MV/m. The installation and commissioning of the entire ERLP should be completed in 2006.
Beam current limitation due to BBU, induced by the cavity transverse HOMs, is regarded as a critical issue in 4GLS. The performance of different types of HOM free cavities, using either ferrite absorbers or/and HOM couplers, are computed for comparison. Active compensation between two successive paths through the LINAC, in order to prevent the BBU build up, is also investigated.

SLS *(M. Pedrozzi)*
Three TH2100E (35 MW-3GHz) klystrons are available for use in the *100 MeV LINAC injector* (two in operation + one spare); their cumulated running hours are 30 000, 21 000 and 9 000, respectively. One of them failed (short circuit on filament) and had to be returned to THALES for refurbishment after only 9 000 hours. More generally, a few improvements were brought in the RF system: modifications of the electrical connections inside the HV tank in order to prevent from arcing, interface of access into the PLC for easier setting of the interlock parameters, new recuperation and recycling system of the SF6 gas for the wave guide pressurization; under investigation, the possible use of a wave guide switch that would allow injecting - at reduced energy - still in case of (AS2) klystron failure; at first, the injection efficiency at lower energy (~ 60 MeV) has to be checked.
Seven (180 kW-500 MHz) klystrons are currently available for the 4 SR RF plants and the BO one; an additional one was recently ordered from THALES. In regard to the fast increase in the klystron cost, it was decided to launch the development of a 60 kW solid state amplifier, based on the SOLEIL design, for later substitution in the BO plant; that will lead to the availability of an additional spare klystron for the SR.
Several leaks were detected on the water cooling manifold of the BO & SR RF systems. The possible reasons and cures are being investigated. Since this type of problem is recurrent in

several labs, it was suggested to bring the experience together and in the next ESLS RF meeting, a talk will be dedicated to this topic.
In spite of two failures of the LHe liquefier (turbine replacement), the routine operation of S3HC is fully satisfactory.

ASTRID *(J.S. Nielsen)*
The RF system of ASTRID consists of one 105 MHz copper-plated coaxial TEM cavity powered with a 20 kW tetrode. After investigating the possible use of a circulator, it was considered as not necessary. The cavity RF voltage is controlled by two standard "slow" amplitude and phase loops and a fast direct RF feedback. Some mismatch at injection leads to synchrotron oscillations that are too fast to be cancelled by the feedback. In addition, the high beam loading at the end of the injection process, together with the need of a very low RF voltage for capture efficiency, creates an unstable situation leading to beam drops and ringing of the fast feedback loop. Bunching the beam from the microtron or/and implementing a fast longitudinal feedback are regarded as possible further improvements.

CONCLUSIONS *(P. Marchand)*
The existing synchrotron light facilities are going well ! While insuring routine user operation of high quality, the various systems and in particular the RF ones are in permanent evolution. It remains quite challenging of achieving such upgrades without disturbing too much the user operation. As regards to the RF power transmitters, there is a clear tendency of substituting, on the one hand, the klystrons by IOTs or solid state amplifiers and, on the other hand, analogue by digital technology in the LLRF control loops.