LHC RF Meeting 15th September 2006

Participants: Luca Arnaudon, Philippe Baudrenghien, Thomas Bohl, Olivier Brunner, Andy Butterworth, Edmond Ciapala, Trevor Linnecar, Pierre Maesen, John Molendijk, Eric Montesinos, Joachim Tückmantel, Daniel Valuch, Frode Weierud.

1. UX45/RUX45 installation (Olivier et al)

Olivier gave present status and an account of recent progress and presented some <u>photographs</u>: (\\cern.ch\dfs\Departments\AB\Groups\RF\Sections\MK\pictures\HRF Meeting 15.9.06)

ADT kickers: These are now fully installed and fitted on their supports.

A protecting 'garage' is being made for each kicker assembly. This protection is however not intended to be stood on and will be made in such a way that this would not be attempted.

4 ACS WRL heaters: There are two heaters. They will be put in place in two weeks time. The heaters are bulky objects, to be fitted in behind the modules where space is already very limited. The fitting in of the heaters, pipes and valves is being checked out with the integration team. The installation and welding work on the whole system is a concern, as there is risk to damage of cables and delicate equipment from people working in the confined space. Close follow up will be needed on our side. A passageway is needed over the vacuum chambers between the two centre modules to allow access. This is under study. It may be possible to leave parts of the waveguide system open near the modules till the end of installation to give more working space.

Couplers on installed ACS modules: The waveguide assemblies have been fitted onto all the couplers of the cavities in the tunnel and a protective cover fitted on top to protect the couplers. The condenser assemblies will be fitted after module alignment. A complete assembly of all equipment will be done on one coupler to fully check all the motor drive and control interfaces, before completing the others.

Vacuum system :

• **Vacuum chambers** will be put in place next week, work on fixing supports on the floor is ongoing. The interconnecting bellows will be fitted next month.

Vacuum valves on the modules: These will remain closed until all vacuum work and bakeout is complete, and will only be opened when all work in the zone is complete and we are about to start powering the modules.

• Electricity distribution for bake-out in RUX45 -Work will start next week.

• ACS Insulation vacuum pumps: Pumps on two modules will be changed to the other side of the modules. This will need the availability of VA group power supplies and electronics. We understand this is planned for the near future.

Survey: This will start next Monday and will probably take two weeks. The APWs should therefore be put in place end of next week or beginning of the week after.

Flexwell cables:

• The **two flexwell ACS antenna cables** which have been bent too tightly around a corner of the tunnel wall still remain to be measured. (Action: J-C Perrier)

• **Module RF cables:** Pierre will take responsibility for ensuring that the ACS module antenna and HOM cables are cut to the correct length, have their connectors properly mounted and that they are safely secured.

• **Cable cutting:** The cables to the directional couplers on the waveguides for cavity forward power near the modules will be cut to the same length as the antenna cables. This is to ensure that phase errors are not introduced into the cavity tuning system with temperature variations.

• ACS HOM cables: A number of these pass through waveguide holes and lie on top of the waveguides. We expect temperatures to rise to 60 °C during operation. We will therefore try to find a solution to avoid them touching the waveguides and also to ensure a flow of air. We do not expect to have to seal the spaces between the waveguides and the shielding wall as these spaces to not contribute significantly to radiation levels passing into UX45.

• ACS HOM cable rolls: The positioning of these still has to be decided – on the wall or on the platform. We should avoid the cables them too tightly rolled up, to avoid over-heating. Daniel has agreed to help look at this. (Action: Olivier, Daniel)

• **APW cable patch panel supports:** The vertical support bars for the cables and patch panels are in place. The cables can be cut as soon as the patch panel is installed, keeping them out of the way of damage from transport and other activities.

• **380 V distribution box in Faraday cage:** The wiring has still to put in order, but it has been agreed that simple coloured labels can be put on the on the uncoloured phase wires. The flying cable for lighting inside the cage has been removed.

ADT water cooling: The rubber strips to prevent vibration still have to be fitted between the water pipes and their support brackets. This again needs to be done with close supervision to avoid risk of damage to the now installed kickers.

Crash barriers: The protective 'crash barriers' are in now place all along the RF zone, including the APW and ADT sections in the RUX and RBs.

Tunnel earthing: The earthing connections have been agreed with TS-EL. We should make use of and update existing UX45 earthing drawing "UX45 - EARTH CIRCUIT EQUIPMENTS" - CDD drawing LHCEIE__4012

Klystrons and circulators in UX45: There are now six klystrons and six circulators in place.

2. ACS cavities and couplers:

Coupler tests: Couplers MC125 and 130 have been dismantled from the SA2 test cavity. The vacuum gauges need to be changed; these still need to be obtained the vacuum group

Spare (single) cavity progress: We have obtained all parts, including tuning, to assemble the test cavity and close its cryostat. Coupler MC130 will be fitted next week. It will go into the bunker in week 41, following completion of the remaining mechanical work.

3. ADT Amplifiers:

Schedule: Dubna has promised series delivery starting from February 2007. Our test and installation schedule requires that they be delivered sooner. Fitting of final components would therefore better be done here, allowing the planned tests by Dubna staff towards the end of this year.

Components: All remaining components (e.g. resistors, capacitors) have been ordered.

4. LLRF

DDS / Conditioning module: (John) Only minor problems have been found with the first prototype, all of which can be repaired to allow the module to be tested on a real cavity. Only the FM modulator function needs to be tested. The spectral purity of the RF output is good. With these very promising results we are in a position to test the system on the spare single cavity in SM18 (see above) in October. Software is also well advanced.

Faraday Cage Signal distribution Chassis: (Daniel) One chassis has been installed in a UX45 Faraday cage. Heat tests are also ongoing in the lab to measure any drifts with temperature.

Switch and Protection module: (Philippe) A first prototype will be available in October. The software team would appreciate a basic functional spec and memory map. This would also be useful in general for other oncoming modules, as it allows the drivers and FESA software to be prepared in advance and any potential problems caught before going to the design office.

WME crates: The guide rails for mounting the crates in the racks are too thick, making the crates difficult to put in place. We will need to procure new rails. Suitable types exist.

5. AoB

TS-DEM services (Trevor) Erik Van de Bij has reminded us that TS-DEM can provide help with ordering of components i.e. request all offers, make the orders, receive the components. They would of course closely interact with us for any technical questions. He needs to estimate additional FSU capacity for this work

We should consider this option further and contact Erik if we intend to make use of this and if so provide an initial indication of the estimated work load.

Note that they also have a cabling workshop with immediately available capacity; we have successfully used this in the past.

Budgets: We are re-estimating expected expenditure on LHC work, including operation and spares, from now till the end of the year. Trevor needs this for Monday.

Next Meeting: Friday 22nd September at 08:45 in the JBA room.

E. Ciapala, 20th September 2006.