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Report on 201 MHz MTA Cavity Workshop

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Luca has made excellent progress on tuner actuator measurements. All of the tuner actuators are bench tested. He has started the procurement of spare parts to replace one bad pressure regulator. He has come up with a preliminary proposal for pneumatic manifolds, made a detailed list of instrumentation and locations. Luca has mapped all of the vacuum vessel ports, given them a label, and assigned their function. He has only one month left in his first tour of duty.

The couplers will be conditioned along with the cavity in situ at MTA. This decision was made based on the lack of a coupler conditioning stand, coupler delivery schedule (as yet not defined), lack of mechanical support, and no need to build any special RF distribution in MTA. A careful conditioning plan needs to be devised and implemented. Dave Peterson has already done much of this work for 805 MHz. Many RF systems have been conditioned this way historically. Al Moretti thought this a good idea, Ralph agrees.

The assembly of the cavity at Lab 6 was outlined and it became clear that any vacuum tests at Lab 6 have little added value. The vacuum vessel has already been vacuum certified. Full assembly at Lab 6 would then require complete disassembly before transport. Additionally, the new low profile stand necessary for transport does not have any clearance for vacuum attachments. The tight “squeeze” through the MTA labyrinth means all extremities and side covers must be removed from the vacuum vessel for the move. This constitutes over 90 % of the vacuum seals.

The new 201 MHz vessel/cavity presents three times the surface area and twice the volume of the previous test. It has been five years since LBNL has performed any vacuum calculations. LBNL will revisit this issue and provide FNAL a vacuum report. MTA has a fixed roughing system and getter pump. Understanding if this is adequate for reasonable pump down times is good information to have ahead of time.

The vacuum for the vessel and cavity is common at the vacuum port. A large concentric vacuum “throat” allows for better conductance to the cavity. This “throat” adapter has yet to be located at Fermilab. It is not clear if a bake will be necessary. Bake out was certainly “news” to Ryan, and no design or concept currently exists. It was mentioned that a hot water system was designed for the first cavity test years ago, but it never passed FNAL safety and was never used. Bake out blankets with a common vacuum to cavity and vessel could result in a very long bake time. Hot nitrogen gas was also mentioned. Details of bake instrumentation are not defined. The vacuum vessel has large O rings as the seal. Ryan believes the maximum vacuum achievable may only be in the ten to the minus 6 range, and the cavity could only be marginally better than that, so bake out may not be a viable option with the current vessel design. More needs to be investigated for the vacuum system. No vacuum expert has been assigned.

There could be issues with the MTA clean room size and headroom. Ryan has agreed to investigate in the very near future so that this potential delay can be avoided well in advance of the cavity showing up at MTA. Raising the clean room is a significant task according to those with experience with that clean room.

The coupler design is very close to complete. LBNL indicates there is inadequate funding at LBNL to start the fabrication. There was discussion as to who would procure materials. Steve Virostek is to provide a list of materials. If there is any hope of getting couplers to Fermilab by the end of the calendar year, the funding must be found soon. Ralph suggested the coupler have 5-degree circumferential marks placed mechanically scratched on the couplers. There will be multiple assembly and disassembly steps where such markings would assist in getting the orientation correct each time. Final coupler tuning would still be performed with a network analyzer.

LBNL has agreed to send FNAL two of their RF test coupler loops so that initial characteristics of the cavity can be measured well before it is installed in the vacuum vessel. Al Moretti has come up with a “top hat” concept for the port at the top of the cavity. This port has multiple duties of vacuum measurement, spark detection, and RF coupling loops. Al’s cartoon needs mechanical design as the space has a maximum 2-inch vertical clearance. Ryan has agreed to take a look at it.