

Minutes of PLUME Phone meeting - 6th March 2010

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Participants:

- University of Bristol: Joel Goldstein,
- DESY, Hamburg: Lena Bachynska, Ingrid Gregor, Ulrich Koetz,
- University of Oxford: Andrei Nomerotski (at Strasbourg),
- IPHC, Strasbourg: Marc Winter, Gilles Claus, Mathieu Goffe, Nathalie Chon-Sen.

Agenda:

The agenda contained one presentation for which the slides are available at <http://indico.cern.ch/conferenceDisplay.py?confId=90043>

The general project status is that the electrical tests of the PCB version of flex (clock) has been pursued by Andrei in Strasbourg. DESY team has been in Strasbourg to be introduced on analogue power pulsing and will be able to mount a test bench at DESY. We have all components to start the module assembly.

1) Flex activity, Andrei

Andrei summarized the electrical test he has done on the PCB version of flex in Strasbourg, focused on the clock propagation. He has measured the signal shape at four points of the flex. The rise time parameter at 80 and 150 MHz was found to be $\sim 1\text{ns}$ which is a good result leading us to the conclusion that the clock shouldn't be a problem.

The 12 kapton flexes ordered from GRAPHIC should be delivered in Oxford this week (8th March 2010). SMD components will be mounted. First visual inspections & tests will be performed. We are expecting them for the end of April.

The same design has been sent to other vendors in order to qualify them (Cicorel (Switzerland), OpticPrint (Switzerland), Datex Instruments (US)).

A stiffener will be glued this week to the flex.

A 120 μm thick MIMOSA-26 will be glued and bounded on the PCB flex, next week.

2) Module Assembly, Nathalie

All elements are available and we are able to start the module assembly. We have one fully equipped (with SMD components) PCB version of flex. The MIMOSA-26 sensors (50 μm thick) have been received in Strasbourg. The bonding tests performed on the PCB to check the pad surface have been successful and the pulling resistance test showed that the wire can resist until a traction of 10g.

Concerning the sole status, as people involved are in vacation, no drawing is available yet, but the conclusion of the meeting we had with them in the middle of March, results in making a first prototype with the available material which is ERTALON (Polyamide, PA6) an ESD material (static dissipative & conductive). The perfect material would have to be at the same time conductor for the transport and

non-conductor for laboratory tests. A hole will be made in the sole in order to accommodate with the stiffener under the connector which will be of 300 um thick. The stiffener will be as large as the flex (24.6 mm width) and in length will cover the connector + an additional 5 mm on the left of the connector (~25 mm length). The sole dimensions are : (length, width, thickness) = (28 cm, 8 cm, 1-1.5 cm). The sole will look like the tool to glue the sensor on the flex. The sole will be pinned by 5 ears and will have a vacuum sucking trench under the flex to maintain it during the laboratory tests with an additional "T" stiffener screwed on the sole that will push on the connection cable ("Jumper cable") and maintain it. For the transport between laboratories, a cover will be produced with an overall cavity not to damage sensors, bonding, SMD which is the fastest and easiest way to go. Then the cover and the sole will just have to be clamped.

3) Ladder-box design, Joel

Discussion on the mechanical support design based on slide 10 of Andrei's presentation.

It's another philosophy centered on the mechanical point of view. We agreed to implement the modifications following Andrei's idea that makes the ladder rigid and motionless in the electrical connection part. Then, to enable the ladder thermal elongation, the ladder left end will not be glued on the support but clamped. Hence it will also be possible to remove the ladder from its mechanical support. We also discuss the possibility to remove the top bar at the right end of the flex to ease the ladder handling and to think about an output in the beam direction to make the air flow out to be able to also benefit from the cooling contact with the telescope ground.

The SiC foam 8% has been ordered in pieces and will be delivered in June.

The foam pieces are 2 mm x 24.6 mm x 166 mm. The tolerance on the second two dimensions is only about 0.5mm as it comes from cutting the foam before the silicon deposition. The top and bottom faces will be precision machined after deposition to achieve 0.1mm flatness/parallelism.

4) Ladder assembly planning

Proposal (to be checked) : Two "mechanical" kapton flexes equipped with 6xMIMOSA-20 thinned to 50 um should be sent to Bristol in June so that Joel can train to assemble the ladder. This would depend on MIMOSA-20 sensors availability.

This should correspond to the foam delivery in Bristol. It was previously discussed that Joel may use the sole as a tool for the assembly, but Joel needs to see the sole mechanical drawing (when available) to say if it could be feasible. Otherwise, an easier way for him would be to develop another tool in Bristol.

5) Test preparation :

- *Electrical/functional tests at IPHC :*

A 120 um thick MIMOSA-26 will be bonded to the flex close to the connector.

Preliminary tests will be performed with Andrei's break out board (power supply, JTAG) until the auxiliary board and jumper cable will be ready (beginning of May).

Status of Mathieu on auxiliary board : 10 PCB cards & SMD components have been delivered to Strasbourg, components will be mounted on 2 PCB cards. Accounting for the cards debugging it should a priori be ready in ~2 weeks.

Another PCB card has been produced in parallel in case the jumper cable wouldn't work. The connection with the auxiliary board is made from this PCB through a standard flat cable. It has been submitted one week ago, we will receive it in 1-2 weeks and the connector will be mounted on it.

Status of Mathieu on jumper cable (= soft kapton cable making the connection between auxiliary board and ladder) : a vendor hasn't been chosen yet, the price list is being examined. When ordered, we have to expect 10 production days.

- *Power pulsing tests at DESY :*

Ingrid expressed her thanks to IPHC team that made tremendous work to prepare the analogue power pulsing tests. For the moment, Lena is assembling the test bench. Tests will start as soon as possible.

- Position survey after ladder assembly and in operation in Bristol :

The LCFI equipment at RAL could be used. Joel commits himself in training someone to do it (not 100% guaranteed).

- Thermal & power dissipation measurement at IPHC :

We can make preliminary simple measurement of the temperature rise resulting from this flex design by emulating the total flex resistance by an equivalent resistor connected at the left end of the flex on the capacitor. Of course this will not enable to study the temperature gradient as everything will be localized on the resistor but will give us an idea.

6) AOB

- Mirror flex design, Andrei : We could start investigating on the difficulties of making a mirror design (P. Hastings is available), that could help up on the mechanical point of view.

Mirror flex will not be produced before the tests on the present flex design have been completed.

- US proposal (BNL, Jefferson Lab and Columbia), Marc : to fabricate additional PLUME ladders for a vertex detector at an electron-ion collider in the US. A 50k\$ financial support would be provided for 2-3 PLUME ladders. If project approved, it should start in October 2010 to September 2014 with first PLUME ladders tests in US in 2013. This represents additional funds for the PLUME project without changing our current R&D.

Next phone call planned on the 4th May 2010 at 2:00 PM (Paris time).

Next PLUME meeting at CERN planned on the 2nd June 2010 (all day).