

2016-07-25 nBLM kickoff meeting

Monday, July 25, 2016

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Florence

- Emphasized importance of defining interfaces between Saclay and ESS Lund as well as interface to ICS. Definition of ESS standards are also important to understand in regards to their impact on scope of work.
- Action: ICS scope and interfaces should be defined and reviewed at the PDR.

Thomas P

- Presented overview of MM for ESS application
- Fission detector is also a possibility
- **Action:** confirm project milestones and dates for commissioning of nBLM system with first beam.
- **Action:** consider delivery of first vertically integrated detectors in time for first 3.6 MeV beam in Lund (could be prototypes, or first articles, etc if final integrated devices are not yet available)
- End of November: PDR 1. Scope: prototype detector experience, initial electronics design.
 - Action: Assure that preliminary ICS scope and interfaces is reviewed at this time.
- CDR-1 and CDR-2 separated by 5 months.
 - Consider using CDR-1 to approve commencement of component manufacturing and procurements, particularly those that may contribute high schedule risk.
- **Action:** Include continuous system self test in the design
 - Alarm if errors are discovered
- Background gammas
 - Primarily from nearby DTL structures but Spokes may also contribute
 - Action: get information from Legnaro, Orsay/Uppsala (spokes) , CERN (Linac4)
- **Action:** specify who is responsible for detector mounting
- **Action:** confirm responsibility for shipping
- Note: many specifications are TBD
- **Action:** Define how BCM and nBLM will work as a suite of instrumentation to provide protection function.

- **Action:** document the fact that a schedule risk exists primarily due to aggressive production schedule, but also compressed development.

Francois

- **Action:** review ICS estimate and BI estimate for consistency. Identify missing items (or budget) and also double counting.
- 12 months for controls development from T0 (validated controls box) to vertically integrated prototype. Completion date for prototype is March 2018 in Thomas P's schedule. Therefore, Francois needs to complete the validation of the control box by March 2017 and then begin using it to develop the nBLM prototype.
- Timo announced that production IOxOS boards would be delivered earlier than we anticipated so that the T0 date could be met with some schedule float.
- Action: work out technical scope in ICS and BI annexes such that it can be presented to CEA lawyers in mid September (based on discussion with Florence)

Philippe

- 20 meters between detector with preamp and the front end electronics (to achieve high bandwidth and count rates)
- Open question: where should we locate the digitizer? How do we achieve required performance within standard ICS architecture?

Timo

- Presented overview of ICS standards and architecture
- Confirmed that fully tested and ICS-supported MTCA systems with IOxOS boards will be delivered to partners (including Saclay) in October 2016. They can then be used in BI prototypes like the nBLM.

Annika

- MPS overview
- Ion chambers, BCMs and a few BPMs will definitely be connected to BIS; nBLM may be.
 - In any case, all MPS functions and the interfaces to BIS shall be provided

Irena

- Overview of BLM system with three detector technologies
- 1 W/m is not necessarily a relevant guideline for operational losses in the DTL (due to beam energy and geometry of tanks)
- Preliminary results of simulations appear promising for using nBLMs both for protection and tuning

Duy

- **Action:** Duy will send documentation that can be used to select materials. For now, we will treat this collection as the accelerator division's "materials

handbook".

- **Action:** determine the concentration of methane that is treated as nonflammable at ESS.
- **Action:** Duy provides feedback on use of U-238 and cadmium.
- **Action:** identify point of contact for gas line layout and installation
- Saclay submits a list of materials for feedback/approval. Also include detector materials for purposes of waste disposal
 - Preliminary list should be included with documentation for PDR 1
- ESS has a handbook for design of electronic equipment. Saclay will work to that.
- Invite Jorgen Mattson (sp?) to review design for electrical safety.
- Action: assure that Saclay team has access to CHESS and other systems at ESS.

Simulations: Georgios and Laura

- Overview of simulations in Fluka and Geant4 done so far
- Plans for simulations and downselection of detector technology

System integration discussion (overtime session on Tuesday afternoon)

- Controls at Saclay can handle all EPICS integration, including some software development as needed to support nBLM functionality
- No resources have been identified that can support FPGA development at Saclay
- As already planned, specification of the nBLM-specific FPGA and software algorithms will be done in collaboration between Saclay diagnostics team and ESS-Lund diagnostics team.
- **Action:** FPGA implementation tasks will move from Saclay to Lund - the draft Annex and budget must be updated to reflect this change
- Goal: demonstrate a very first version of electronics by 1 December, 2016. The Saclay diagnostics team would provide a detector, preamp (existing units), and cable. The Lund diagnostics team in collaboration with ICS would provide the MTCA-based digitizer, firmware and software. The goal of the demonstration would be to check signal integrity and noise through the system and identify areas that demand attention during the next phase of the design. The required functionality is then limited to a simple scope replacement: digitize the preamp output and periodically display the waveform in CSS; maybe add a threshold trigger and a counter for the trigger occurrences. An option is to also include a demo of the current mode readout based on the BLEDP, but this may require quite an intense neutron source or some proxy circuit in place of the detector.
- Philippe: CAEN desktop box is probably not the appropriate platform to support customized firmware. Therefore, we should focus effort on MTCA implementation.
- If the analog electronics is kept simple and the detailed waveforms are

- If the analog electronics is kept simple and the detected waveforms are oversampled (~ 2.5 Gsa/s; maybe less for higher capacitance detectors), then the firmware can detect and compensate for pileup, etc