BLM for the crab-cavity test stand

Meeting notes

Presents: B.Dehning, C.Zamantzas, G.Vandoni

We discussed yesterday the installation of a Beam Loss Monitor at the crab-cavity cryomodule. The crab cavity cryomodule shall be installed downstream of QDA61710, between the QD and TPSG61773.
The installation calendar is sketched in Table 1.

YETS15-16	Run 2016	EYETS16-17	Run 2017	YETS17-18	Run 2018
• Uncabling • 3D scans • Clearing BA6	• Spec's • Purchase • DIC /DIR	• Cabling • Installation of cryo transfer line • Preparation BA6 (civil engineering and supports) • Vacuum layout modification	• Equipment in BA6 • Production	• Installation of cryomodule • Installation of cryoplant • Installation of all infrastructure	• Operation run

We aim at a BLM for machine protection. The cavities represent a beam aperture limitation at 84mm diameter. The BLM will not be used to position the table with respect to beam by minimization of the losses. The type of beam to be used is not fully defined yet, but the test program will in the end include coasting, full energy and intensity beam.

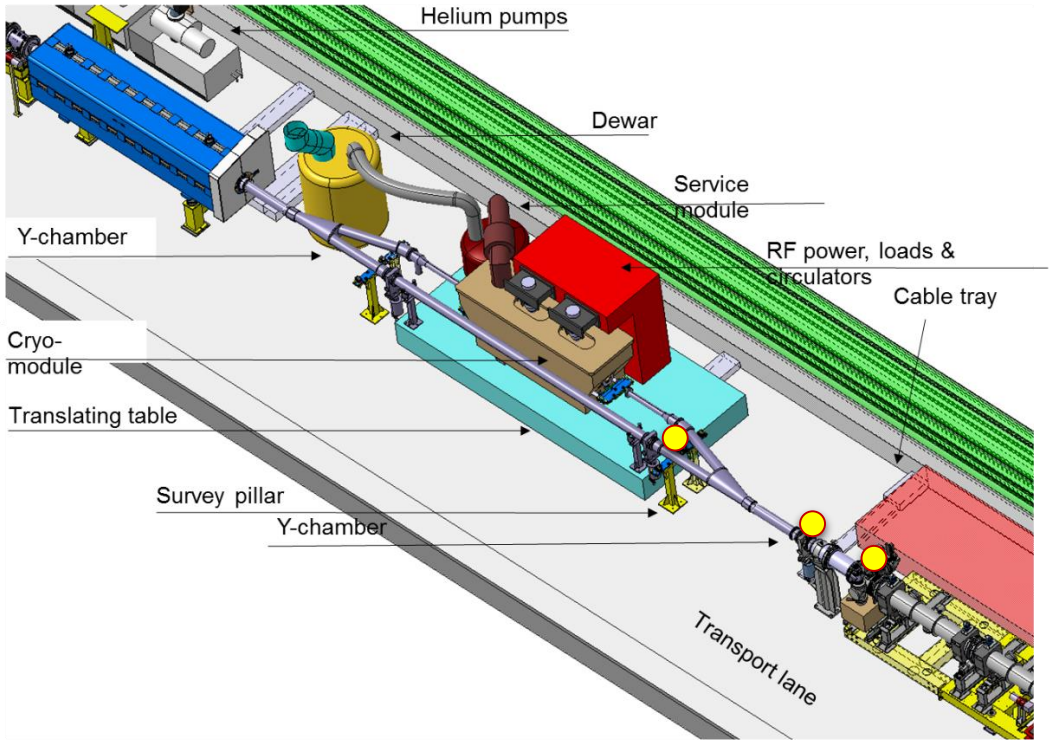

Figure 1: the yellow dots show best positions for a BLM, for maximal sensitivity

Seen the materials and thicknesses in the cryomodule (which is rather an assembly of vacuum and gas vessels, with small thickness of material) the best location for a BLM seems to be downstream of the cryomodule, in the positions shown on Figure 1. These positions would ensure maximal sensitivity. The best orientation would be longitudinal; vertical orientation would bring to a factor 2 loss in sensitivity, still acceptable in case of integration difficulties.

The proposal is to have a LHC ionization chamber, described below:

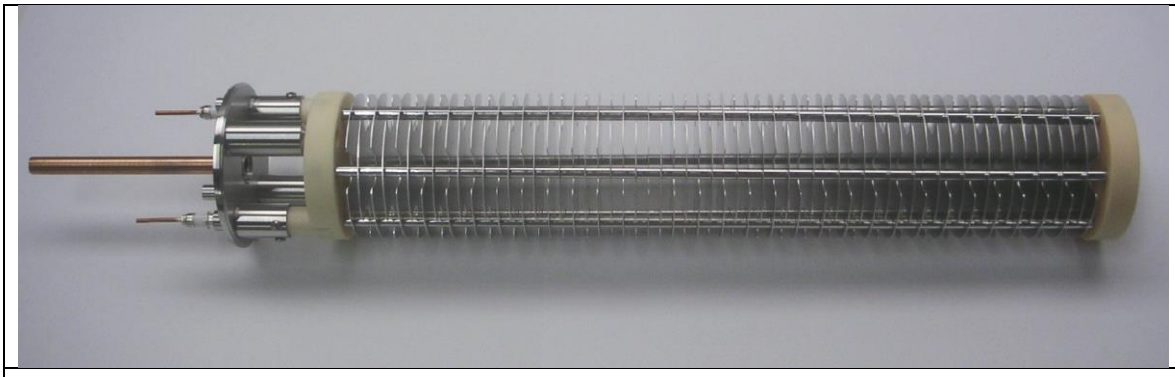

Figure 2: LHC-type ionization chamber
Diameter: 89mm
Length: 600mm
Bias voltage: 1500V

To determine the best location amongst the three above, FLUKA calculation should be carried out. Integration may be complicated as the area is crowded. Ideally, the BLM should have its own support and not be supported directly from a vacuum chamber; in case of need to dismount a vacuum chamber, the BLM creates responsibility problems to the VSC group.
The choice of the LHC-type ionization chamber rests on the fact that there is sufficient spare, oppositely to SPS-type BLMs.
The new BLM would be integrated in the SPS system. Availability of spare channels may be an issue, to be checked by **ChZ**.

BE-BI asks to mention the new BLM in the Space Reservation Request, then in the ECR. This is not for space reasons, but to state that the work has to be done. It is better to cite it as “Ionization Chamber” and not whether LHC-type or SPS-type, as long as the decision is not confirmed.

Sensitivity, energy cut-off and other parameters should be specified by GV. **BeD** will ask the questions he needs, such that GV can ask for confirmation.
How to proceed:

1. BLM cited in the SRR (**GV**)
2. Fluka calculation for best sensitivity (asked by **GV**)
3. In parallel, integration study (**GV**)
4. Proposal to BE-BI on it
5. DIC by BE-BI
6. Integration in the SPS system by BE-BI

These Ionization chambers have a cut-off energy at 50 MeV: is it an issue here?

[1] Layout schemes: SPSLNINS0086, SLSLNINS0044
[2] R.Calaga at MSWG, 29th April 2016, https://indico.cern.ch/event/524457/
[3] G.Vandoni at Chamonix 2016, https://indico.cern.ch/event/448109/contributions/1942024/