GEM Commissioning Plan

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1 Purpose

The focus of this document is to plan to full procedure for the BigBite GEM commissioning with beam at the start of the GMn experiment in the SBS run program. The commissioning of the GEMs is essential for optics reconstruction. The successful commissioning of the GEMs implies an understanding of the internal alignment of the GEMs and an optimal gain setting with known efficiency.

2 Commissioning Tasks

2.1 HV scan

With the beam on at 5 uA on the single foil C target, all GEM layers should be turned on. The trigger should use the GMn1 configuration. GEM layers 1, 3, and 5 will be varied individually in voltage according to Table 1. GEM layers 2 and 4 will be varied individually in voltage according to Table 2.

Table 1: HV scan in UV and back tracker layers

Voltage	Expected Current [μA]
3564	727.27
3519	718.18
3475	709.09
3430	700.00
3385	690.91

Table 2: HV scan in XY (INFN) layers

Voltage	Expected Current [μA]	Trip Current [μA]
4050**	102.7	104
4000	101.5	102.5
3950	100.2	102
3900	98.9	100

The expected current for the INFN GEMs is an average for all the chambers. There will be some variances per chamber around this value, but all should remain well under the trip limit. Additionally, the "**" in Table 2 indicates an HV value that will be skipped unless it is later determined that we go back and find the efficiency at that voltage.
The trip level for UVa GEMs will always be set to **780 μA**. The procedure for the HV scan is described:

1. Set the INFN GEMs to 4kV and the UVa GEMs to 3564 V.
2. Vary each layer individually according to the relevant table.
3. Run Andrew's GUI analysis and record the efficiencies per layer
   1. From **a-onl**
   2. Run **panguin -r runnum -f $SBS_REPLAY/onlineGUIconfig/bb_gem_efficiency.cfg**

4. Plot the efficiencies per layer vs the voltage. Use the numbers generated by Fig. 1.

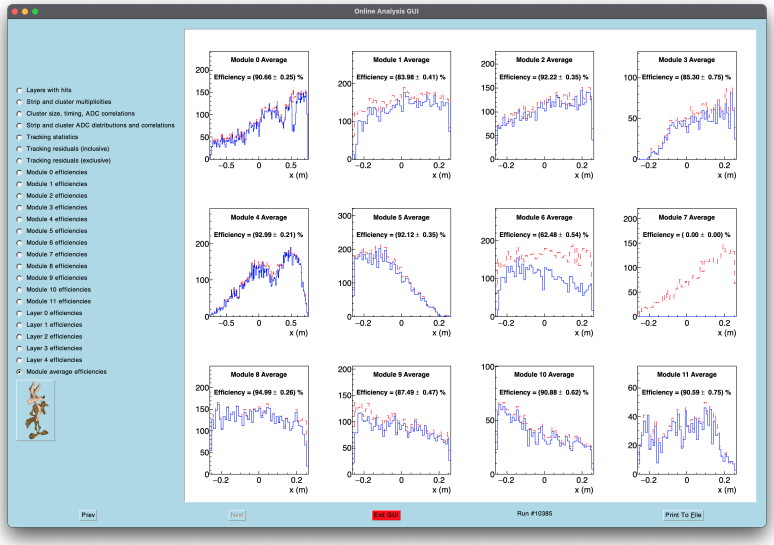

Figure 1: GUI used to record efficiency numbers. Note that Module 0 is Layer 1 UV, and Module 4 is Layer 3 UV. Modules 1-3 correspond to J0 (bot-mid-top) and Modules 5-7 correspond to J2 (bot-mid-top). Modules 8-11 corrsepond to the backtracker from top to bottom.

2.2 Alignment

With the single carbon foil target and sieve installed, ramp BB magnet to off. Ask for a stable beam current of 1 μA.