

Installation and Run plan Agreement for E12-09-019 (G_M^n) and E12-17-004 (G_E^n)

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This write up documents the installation plans and and run plan agreement between the E12-09-019 (G_M^n) and E12-17-004 (G_E^n) Collaborations. It will be submitted to the E12-17-004 ERR Committee to satisfy **ERR Recommendation #4**.

As indicated by the Hall A/C leader at the Hall A meeting in June 2019, the Collaboration recognizes that Hall efforts (technicians and other Hall resources) have G_M^n installation and commissioning as a priority, with G_E^n as a “best effort”.

G_E^n change-over, commissioning, and data production must fall within the scheduled calendar time allocated to G_E^n .

1 Installation

The G_M^n and G_E^n collaborations plan to have all components of the G_E^n polarimeter installed on the SBS carriage prior to beam operations.

1.1 Work/installation plans prior to taking beam

We plan to install and test these components in-situ on the SBS carriage prior to the run.

- All SBS GEM layers will be installed, cabled, and tested.
- Both the right and left Recoil Proton detectors will be installed, cabled, and tested (GEM layers + hodoscope arrays).
- Glasgow active analyzer array will be installed, cabled and tested.

The following components only need to be “test fit” at some point during the pre-beam installation schedule, but will *not* be present for the start of G_M^n beam operations. Note that the test fit needs to be done with an SBS hardware configuration and angle that will be representative of the state during the mid-run G_M^n to G_E^n transition so any interference / installation challenges can be identified and addressed well prior to beam.

- Test fit shield wall on beamline side.
- Test fit shielding in SBS dipole gap.
- Test fit *rear* field clamp.
- Test fit analyzer plate.

1.2 Components to be removed prior to taking beam

The following G_E^n related hardware will be removed prior to the start of G_M^n beam operations. It should remain “staged” in the Hall so it can be efficiently reinstalled during the G_M^n to G_E^n transition period.

- SBS *rear* field clamp (if still present after test fit)
- Copper analyzer plate (if still present after test fit)
- Shielding in dipole gap and beamline shield wall, as needed.
- Glasgow active analyzer array (cables will be disconnected and left coiled on the carriage for rapid reconnection during the G_M^n to G_E^n transition).
- NOTE: Gas flow to all SBS GEMs will be maintained to help keep the GEM humidity levels stable.

1.3 Note on impact of G_E^n RP detectors on G_M^n minimum SBS angle

Both the right and left Recoil Proton detectors will be left in place on the SBS carriage. This nominally limits the SBS angle setting to $> 24^\circ$ until after the G_E^n program is complete. Organizing the run plan to accommodate this is discussed in the **Run Plan** section that follows.

2 Run Plan

E12-17-004 has been approved for 120 PAC hours, or a nominal 10 calendar days at the typically assumed 50% efficiency. Of those 120 PAC hours, 12 PAC hours (or a nominal 3 calendar shifts) have been allocated to overhead associated with G_E^n -related configuration changes.

1. G_M^n startup and initial running.
 - The G_M^n PIs are in agreement with the PAC recommendation and agree that G_E^n will take data during the G_M^n run period just after the G_E^n $Q^2 = 4.5(\text{GeV}/c)^2$ kinematic setting.
 - Accessible G_M^n kinematic settings will be subject to the SBS minimum angle limit ($> 24^\circ$) imposed by the the beamline side recoil proton detector until after the G_E^n run period.

- After G_M^n has completed their $G_E^n Q^2 = 4.5(\text{GeV}/c)^2$ data taking, we will take a (nominal) shift to install the GEN-specific components outlined below.
2. Install the GEN specific components **(nominal 1 shift)**
 - Install shielding in the beamline dipole cutout (if this is not already in-place).
 - Install shield wall on beamline as needed.
 - Install shielding around SBS GEM crates (if not already present).
 - Install field clamp.
 - Install Copper analyzer plate.
 - Install Glasgow analyzer as needed.
 3. Run GEN measurement **(108 PAC hours; 9 calendar days)**
 4. De-install GEN components **(nominal 1 shift)**
 - Remove field clamp (Techs, crane).
 - Remove Copper analyzer plate (Techs, crane).
 - Remove Glasgow analyzer (Collaboration).
 - Remove shield wall on beamline as needed.
 - Remove shielding in SBS dipole gap as needed.
 - Remove shielding around SBS GEM crates.
 - Disconnect cables from the beamline side (left) Recoil Proton detector assembly (Collaboration).
 - Remove beamline side (left) Recoil Proton detector from SBS stand (Techs, crane).
 - The right-side RP detector can remain or be craned off as desired.