

## Design of the Gas Distribution System for the Hall A GEM Detectors

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This note presents the design of the gas distribution system for the BigBite and Super BigBite spectrometers.

The gas electron multiplier (GEM) detector’s gas distribution system (Fig. 1) is designed to supply gas to the GEM detectors in the BigBite and the Super BigBite spectrometer arms from the spectrometers’ pivot. Either pre-mix gas cylinders or a proposed gas mixing system located in the gas shed will be used.

A total flow of ~1000 liters per hour of gas will be distributed to the GEM detectors. Flow meters with valves will be used to control gas flow to the GEM layers. Mass flow transducers will be used to remotely monitor the flow.

At the spectrometer pivot, the pressure of the mixed gas coming from the gas shed will be reduced to 10 psi by a high precision pressure regulator, PR1. Pressure transducers PT1 and PT2 will be used at the inlet and outlet of the regulator for remote monitoring.

The gas distribution manifold #1 is located immediately downstream of PT2. Gas to the GEM detectors located in the Super BigBite and BigBite spectrometer arms will be supplied from manifolds 2-1–2-2 and 4-1–4-12.

The gas lines of manifolds 2-1 and 2-2 will use a flow meter with valve (FMV), flow range of 100 sccm–1000 sccm, and flow transducer with range of 0 sccm–750 sccm. The gas

lines from manifolds 4-1 through 4-12 will use an FMV, flow range of 50 sccm–500 sccm, and flow transducer with range of 0 sccm–400 sccm, in all, a total of ten high flow and 48 standard flow gas supply lines. Gas flow for each line will be set by FMV1 to FMV58.

FMVs and other system components will be mounted on a central panel near the spectrometer pivot. For the FMVs, Dwyer models RMA-12-SSV (50 sccm–500 sccm) and RMA-13-SSV (100 sccm–1000 sccm) have been selected.

Remote monitoring of gas flow will be supplied by low cost, (<\$100 per channel) Honeywell Zypher HAF mass flow transducers, which provide a digital output. The Honeywell mass flow transducers are currently being evaluated for use in this system.

In summary, the Hall A GEM gas distribution system will have a total of 58 individual gas supply lines. Ten of the gas lines will be high flow, up to 1000 sccm, the remaining 48 lines will be standard flow, up to 500 sccm. The distribution system will be located on a single panel near the spectrometer pivot. Individual gas supply lines from the panel will be distributed to the GEM detectors on the BigBite and the Super BigBite spectrometer arms.

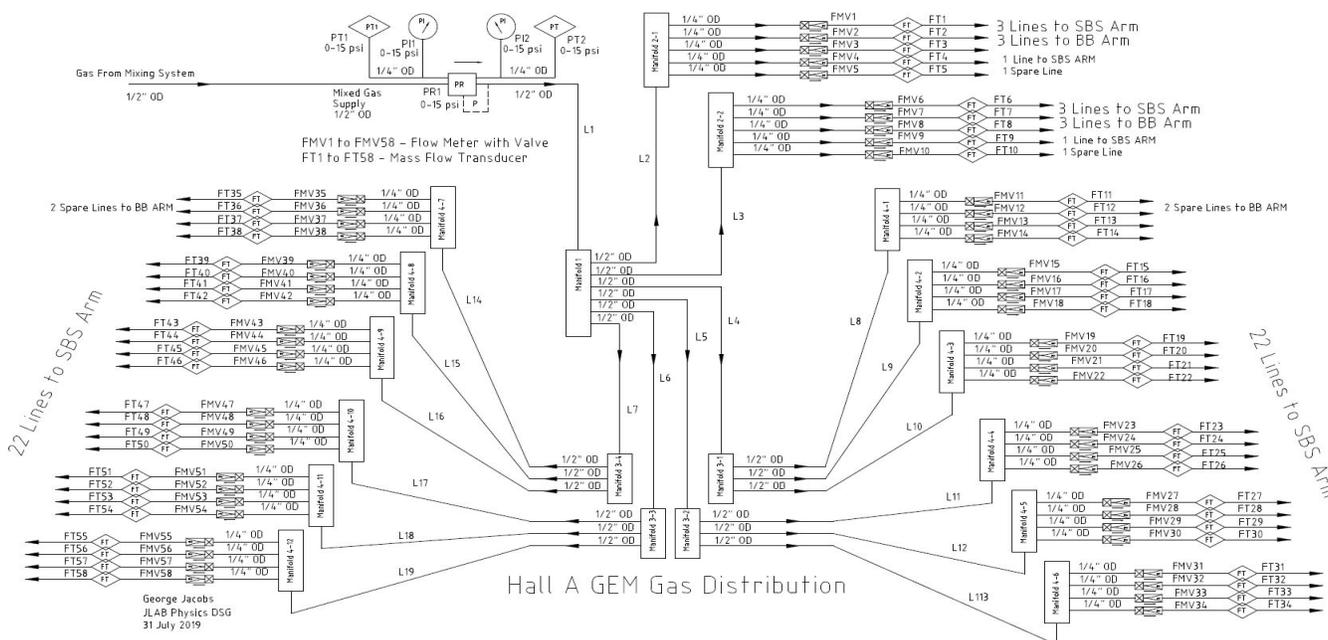


FIG. 1. Gas distribution system for the GEM detectors to be used in the BigBite and Super Big Bite spectrometers.