Gas Controls and Monitoring System for the Bound Nucleon Structure Experiment

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This note overviews the controls and monitoring system developed by the Detector Support Group for the Bound Nucleon Structure Experiment's detector and target gas system.

The Detector Support Group designed, developed, and instrumented the gas system [1, 2] and the controls and monitoring system [3] of the Bound Nucleon Structure Experiment's detector and target gas system.

The Radial Time Projection Chamber (RTPC) and the Drift Monitoring System (DMS) detectors use premixed 20% carbon dioxide and 80% helium. The hardware for the detectors is mounted on lower portion of gas panel A, Fig.1.

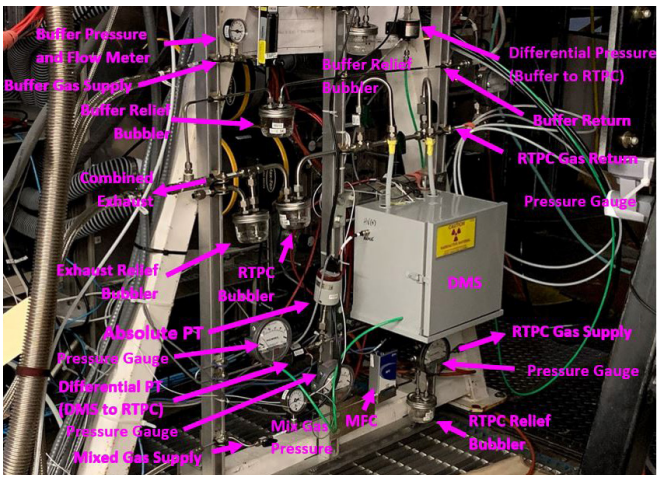

FIG. 1. Detector gas controls and monitoring system's instrumentation located on the *lower* part of the gas panel A.

The target (Kapton straw) gas can be either flammable deuterium or hydrogen , or non-flammable helium or nitrogen. Additionally, there is a buffer volume of helium between the target and the RTPC.

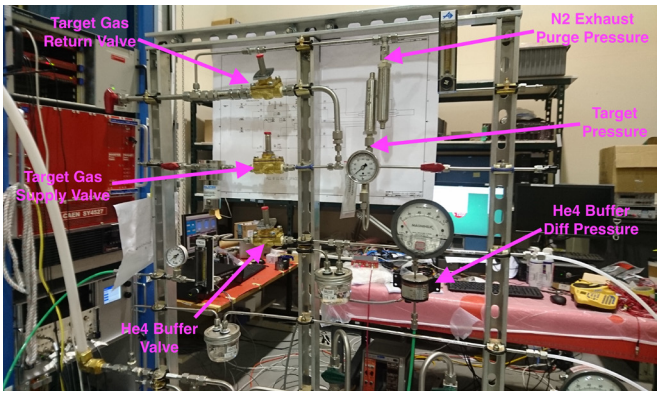

FIG. 2. Target gas controls and monitoring system's instrumentation on the *upper* part of gas panel A.

The target gas instrumentation, Fig. 2, is installed on two panels — *upper* part gas panel A and on a separate gas panel B (Fig. 3) located on the gas pad outside Hall B.

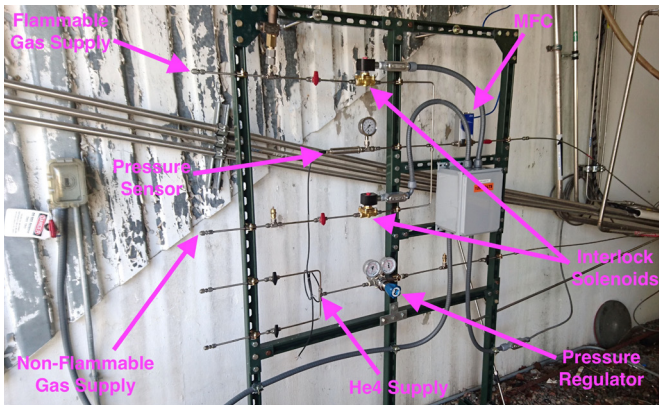

FIG. 3. Target gas control system's instrumentation on gas panel B located outside Hall B on the gas pad.

The controls and monitoring software, written in LabVIEW for a stand-alone cRIO, allows testing in any location. The software for the detector gas has *no interlocks*, only controls and monitoring of sensors; the software for the target gas *has interlocks* and controls and monitoring.

The developed gas system has been tested and deployed in Hall B.

[1] G. Jacobs, et al., *Design of the Gas System for the Radial Time Projection Chamber*, DSG 2018-12, 2018.
[2] G. Jacobs, *The Radial Time Projection Chamber Gas System*, DSG Talk 2018-20, 2018.
[3] M. McMullen, et al., *Gas Controls and Monitoring for Testing the Radial Time Projection Chamber*, DSG 2019-23, 2019.