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The construction and quality assurance testing of the Fermilab Muon g-2 straw tracking detectors

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improvement over the previous E821 measurement at Brookhaven. The experiment will also extend the search for the muon's electric dipole moment (EDM) by approximately two orders of magnitude with a sensitivity down to 10^{-21} e.cm. Both of these measurements are made by an analysis of the modulation of the decay rate of the higher-energy positrons from the (anti-)muon decays recorded by 24 calorimeters and 3 straw tracking detectors. The straw tracking detectors will be used to cross-calibrate the calorimeter, identify pileup and muons lost from the storage region, and to measure the beam-profile. A tracker measurement of the up-down modulation of positrons will be used in the EDM analysis.

In this poster, the mechanical design of the straw tracking detector will be described. Each tracking detector module comprises 128 straws supported by two aluminium manifolds which contain the front-end readout and HV boards which are water cooled via a channel machined into the manifold. The straws are tensioned and crimped with bespoke tools.
The manifold is housed in the vacuum chamber with an interconnecting flange which in turn is connected to the back-end readout electronics via an aluminium snout. Once each module is constructed a dedicated quality-control system will accurately determine the position of the wire at the center of the straws and the radius of each straw. The wire position is determined using a moveable and collimated beta-emitting source with a scintillator trigger and the straw wall using an X-ray source.

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