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The Region One Drift Chamber for the CLAS Spectrometer

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The Region One drift chamber is the innermost of three nested drift chamber packages of the CLAS spectrometer at Thomas Jefferson National Accelerator Facility. The detector was optimized for the CLAS toroidal magnet geometry, and has over 7500 drift cells that span a polar angular range of 8° to 140° and nearly 80% of the azimuth. It consists of six identical wedge-shaped sectors integrated into a single unit. Each sector has thin and relatively weak aluminum endplates which support the large mechanical loads from the wire tensions and associated readout hardware. The unique feature of the detector is its self-supporting design, wherein the wire tensions of neighboring sectors balance each other without massive structural support. Many design factors were crucial to consider in order to achieve tight wire tension tolerances. These include effects such as endplate deformation due to the wire tensions and gravitational sag, as well as the components and procedures necessary for integrating six separate sectors into one self-supporting unit. This talk will focus on the design and engineering challenges of the Region One detector, as well as report on the results of the recently completed detector commissioning runs used to study system performance within the CLAS spectrometer.