

## **Design and Performance of the Layer 0 Detector for D0**

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We describe a new inner layer silicon strip detector installed in the D0 experiment at Fermilab in April of 2006. It is designed to provide a low mass, high resolution, radiation hard, inner layer for the D0 Silicon Microstrip Tracker (D0SMT). Layer 0 should improve impact parameter resolution for low  $P_t$  tracks by a factor of two and b-tagging efficiency in top decay by 15%. The detector consists of 48 silicon strip sensors mounted on six facets on a 1.68 m long, 1.6 cm. radius carbon fiber support structure. It was installed through the inner aperture of the existing D0 Silicon Microstrip Tracker. Sensors near the interaction point, with longer analog cables, are 7cm long, while the four sensors at the ends of the facets are 12 cm long; resulting in approximately balanced capacitive loads. Sensors on the inner facets have 71 micron pitch, while those in the outer facets have 81 micron pitch. This combination provides 98.4% geometrical coverage while keeping the device compact. A variety of techniques were utilized to minimize coherent noise in the readout system. Our initial tests indicate very low levels of coherent noise, below 10% of the random noise. We describe the design of the detector and discuss its performance at the Tevatron.

Submitted by: Ronald Lipton, Fermilab, [lipton@fnal.gov](mailto:lipton@fnal.gov)