

LA-UR-09-0482

Approved for public release;
distribution is unlimited.

Title: Production and performance of the silicon sensor and readout electronics for the PHENIX FVTX Tracker

Author(s): Kapustinsky, Jon S.

Intended for: Meeting in La Biodola, Italy: Frontier Detectors for Frontier Physics



Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the Los Alamos National Security, LLC for the National Nuclear Security Administration of the U.S. Department of Energy under contract DE-AC52-06NA25396. By acceptance of this article, the publisher recognizes that the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.

**Production and performance of the silicon sensor and custom readout electronics
for the PHENIX FVTX Tracker
Jon S Kapustinsky**

The Forward Silicon Vertex Tracker (FVTX) upgrade for the PHENIX detector at RHIC will extend the vertex capability of the central PHENIX Silicon Vertex Tracker (VTX) to forward and backward rapidities, (η), and also extend the reach in the low momentum-fraction region, (x). The FVTX is designed with adequate spatial resolution to separate decay muons coming from the relatively long-lived heavy quark mesons (Charm and Beauty), from prompt particles and the longer-lived pion and kaon decays that originate at the primary collision vertex. These heavy quarks can be used to probe the high density medium that is formed in Au+Au collisions at RHIC. The FVTX will also be used to study the spin structure of the proton. The FVTX is designed as two endcaps. Each endcap is comprised of four silicon disks covering opening angles from 10 to 35 degrees to match the existing muon arm acceptance. Each plane consists of p-on-n, silicon wedges, with ac-coupled mini-strips on 75 μ m radial pitch and projective length in the phi direction that increases with radius. A custom front-end chip, the FPHX, has been designed for the FVTX by the ASIC Design Group at Fermilab. The chip combines fast trigger capability with data push architecture in a low power design. The performance of the sensors and readout chip are described in technical detail.