Abstract Submitted
for the DNP19 Meeting of
The American Physical Society

Development of a Fused Silica Polishing Method ANDI MANKOLLI, University of Illinois at Urbana-Champaign, JZCAP COLLABORATION — The Large Hadron Collider at CERN is being upgraded for high luminosity operations. Protons and heavy ions in the accelerator will collide with unprecedented rates, giving rise to an extremely high-radiation environment. Operating under this high-radiation exposure will be a significant challenge for detector instrumentation, especially for detectors positioned near the beam at small scattering angles. One of these detectors is the Zero Degree Calorimeter (ZDC) of the ATLAS experiment. The ZDC is located inside the LHC tunnel and plays a key-role in determining centrality and number of spectators in heavy ion collisions. The Nuclear Physics Laboratory (NPL) at the University of Illinois collaborates on the development of a radiation-hard ZDC for the ATLAS detector. The ZDC will consist of an electromagnetic module, to detect high energy photons and electrons, followed by three hadronic modules, detecting spectator neutrons from nuclear collisions. The ZDC will be equiped with a Reaction-Plane Detector (RPD), to determine the shower profile and the collision geometry. Both hadronic and electromagnetic modules will be tungsten sampling calorimeters. The active Cherenkov radiator consists of radiation-hard fused silica rods which were developed for LHC luminosity monitors. We present a polishing method for the ends of the rods that was developed to achieve high and uniform light transmission. Prototype detectors were designed, constructed and tested at the CERN SPS in November 2018 and at the Fermilab Test Beam Facility in July 2019. The poster will discuss test beam results for the ZDC prototype performance and present comparisons to MC simulations.

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Date submitted: 24 Jul 2019 Electronic form version 1.4