

# Manufacturing Scintillator Tiles for the STAR Forward Upgrade

Lilian McIntosh

July 2019

## 1 Abstract

Over the last 20 years, Relativistic Heavy Ion Collider (RHIC) experiments at Brookhaven National Laboratory (BNL) have studied the strong interaction through collisions between subatomic particles and nuclei. The Solenoidal Tracker at RHIC (STAR) plays a leading role in providing information regarding the proton structure, properties of the constituents, and their interactions. The STAR Forward Upgrade will enhance its capabilities by creating new low-angle subsystems, including a forward hadronic calorimeter system (HCal). The HCal, as well as a new forward tracker and electromagnetic calorimeter, will enable new low-angle measurements at STAR, including forward jet, dijet, and hadron-in-jet production. Abilene Christian University's (ACU) contribution to the construction of the HCal entails cutting and polishing 6,300 plastic scintillator tiles to the specifications of the upgrade. In recent years, ACU has invested in new facilities that allow this large-scale production to be completed on campus for the first time. A manufacturing process tailored to these facilities was developed to obtain optimal production efficiency and meet the specifications required for the upgrade. The specific process will be presented, including the scintillator cutting and polishing techniques.