Abstract Submitted
for the APR18 Meeting of
The American Physical Society

Single Top + Higgs$\to b\bar{b}$ Production in ATLAS Experiment: Investigating Effect of High Granularity Timing Detector (HGTD) on Analysis with Phase II Upgrade ELIZABETH HELFENBERGER, USHA MALLIK, SPYRIDON ARGYROPOULOS, WEITAO WANG, Univ of Iowa, JOSE BENITEZ, (Formerly) Univ of Iowa, UNIVERSITY OF IOWA ATLAS GROUP TEAM — In 2022, the Large Hadron Collider (LHC) will undergo a High Luminosity (HL) Phase-II Upgrade, which will increase the instantaneous luminosity of the LHC by as much as a factor of 10. The ATLAS detector, operating at the LHC, will be upgraded in preparation for the high luminosity environment. As part of the upgrade, a High Granularity Timing Detector (HGTD) is proposed to be placed near the endcaps of the cylindrical ATLAS detector. The HGTD would record the time-of-flight of particles from the main proton-proton collision with a resolution of 30 ps. We conduct a physics analysis of single top + Higgs $\to bb$ production, or tH, to investigate the impact of the HGTD on the significance of tH compared to its ttbar background. The tH decay mode is relevant because it can help determine both the sign and magnitude of Yukawa coupling between the Higgs boson and top quark. It is also highly sensitive to deviations of the tH cross section from its Standard Model value, meaning there is potential to observe new physics through this channel. In our analysis, we compare tH significance before and after including the HGTD in the simulation. We find that implementing the HGTD with features such as a forward electron trigger could increase tH significance by as much as 13%.

Elizabeth Helfenberger
Univ of Iowa

Date submitted: 16 Jan 2018 Electronic form version 1.4