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Identifying Exclusive Proton-Proton Interactions in the ATLAS Experiment

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Abstract content
   (Max 300 words)

The Standard Model of particle physics provides our best description for most of the fundamental interactions between all known particles in the universe. Quantum Electrodynamics is the theory of electromagnetic interactions within the Standard Model which makes precise predictions on the probability an exclusive interaction.
Exclusive interactions in this context occur when two hadrons interact via photon exchange and escape the interaction intact while at the same time creating particle anti-particle pair. This work will search for exclusive interactions in proton-proton collisions creating a muon anti-muon pair. We are considering di-muon production due to the accuracy with which muons can be tracked by the ATLAS detector.
At high luminosities in the LHC, on the order of 20 interactions per beam crossing are to be expected. This pile-up of interactions creates a significant challenge by inducing a large amount of background which must be disentangled from the signal. In previous experiments exclusive interactions were measured in events with no pile-up. As the LHC reaches higher luminosities, such events become negligibly rare and thus a way of finding these events even in the presence of pile-up is essential.
This work seeks to identify exclusive interactions in the presence of pile-up.

Apply to be
 considered for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD)?

MSc

Main supervisor (name and email)
and his / her institution

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Would you like to <br> submit a short paper <br> for the Conference
 Proceedings (Yes / No)?

Yes

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