

# What am I doing within ATLAS?

## (Recent) Past Work

- ▶ Measurement of  $\chi_{c1}$  and  $\chi_{c2}$  production with  $\sqrt{s} = 7$  TeV  $pp$  collisions at ATLAS
- ▶ Now published **JHEP 1407 (2014) 154**

## Present Work

- ▶ Studying rare Higgs boson decays to quarkonia, specifically  $H \rightarrow Q \gamma$  with  $Q = \{J/\psi, \Upsilon(nS)\}$
- ▶ Potentially one of the only ways to access the charm Yukawa coupling at the LHC
- ▶ Simultaneously studying analogous **Z boson decay** - pioneering it's use as a future **control channel** for a  $H$  search ("new" in its own right - never studied before)
- ▶ Performing a comprehensive ATLAS analysis using the full  $\sqrt{s} = 8$  TeV dataset
- ▶ Results will represent the **first experimental information on Higgs decays to quarkonia**
- ▶ Hope to have a paper released within the next few months
- ▶ Also preparing a set of **sensitivity projections** (based on  $\sqrt{s} = 8$  TeV analysis) for a **HL-LHC** scenario (intend to release separate public note)

# What do I hope to do in the near future?

## Detector Performance

- ▶ Contribute to a measurement of the ATLAS **inner tracker material** distribution using  $\gamma \rightarrow e^+e^-$  **conversions** with early Run II data
- ▶ Important to further improve ATLAS detector simulation - particularly with **new Run II beam pipe and IBL** (new pixel b layer)
- ▶ Already starting to work with Run I data to inform the planning of a Run II analysis - aim to perform + complete measurement during 2015

## Physics Analysis

- ▶ Intend to further study rare Higgs decays to light mesons (e.g.  $H \rightarrow \phi \gamma$ ) that could help constrain the Yukawa couplings of generation I and II quarks
- ▶ Start with in-depth trigger studies (decay topologies often “strange”) as a first real step (truth level have begun) - could be sensitive with Run II data
- ▶ Also interested in the possibility of repeating  $H, Z \rightarrow Q \gamma$  analysis in Run II

## Other (Vague) Ideas

- ▶ Join early BSM Higgs search efforts for Run II?
- ▶ Contribute to first (benchmark) Run II  $J/\psi(\Upsilon)$  production measurement?