

HiggsTools Mid Term Review

Measurement of SM Higgs coupling to tau leptons with the
ATLAS detector

Théo MEGY

Albert-Ludwigs-Universität Freiburg
20.10.2015



My background

Education

- | | |
|-----------|--|
| 2010-2011 | Classe préparatoire
<i>Lycée du parc (Lyon)</i> |
| 2011-2013 | Bachelor degree in Physics-Chemistry
<i>Université Blaise Pascal (Clermont-Ferrand)</i> |
| 2013-2015 | Master degree in Particle Physics
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April to June 2014 **Study of the sgluon discovery potential with the ATLAS detector**
LPC Clermont-Ferrand

February to June 2015 **Study of a Dark Matter model leading to a same-sign top signature with ATLAS**
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⇒ PhD at Albert Ludwigs Universität(Freiburg) since September 1st under Prof. Karl Jakobs supervision

Measurement of SM Higgs coupling to tau leptons with ATLAS

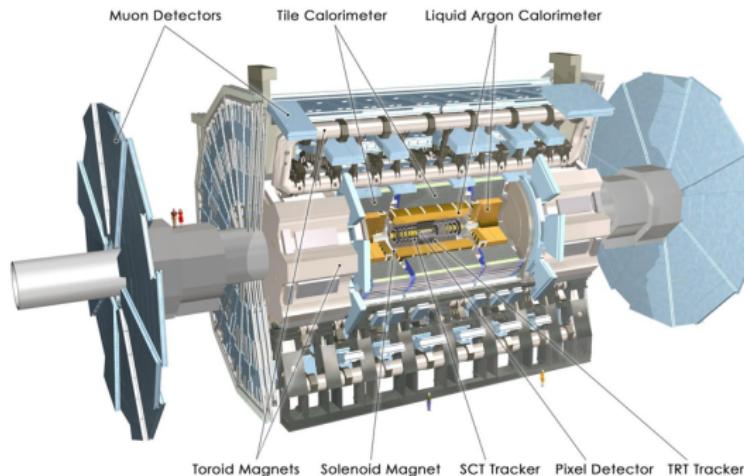
- **Work package 1**

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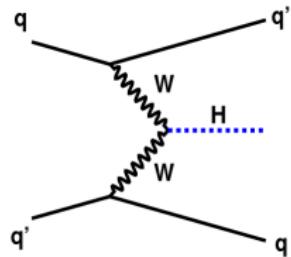
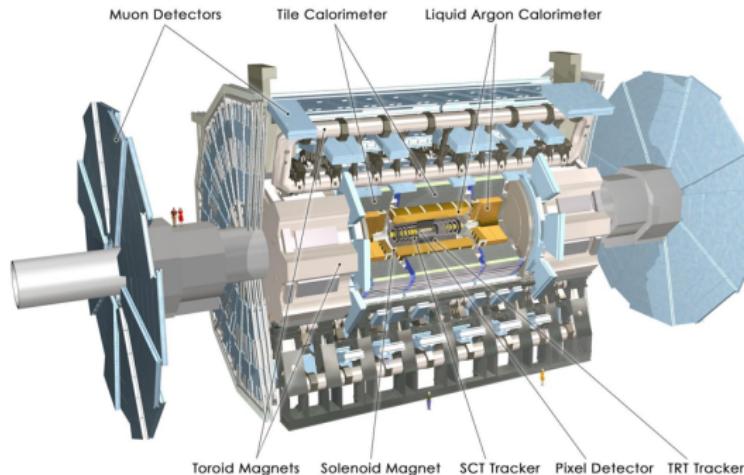


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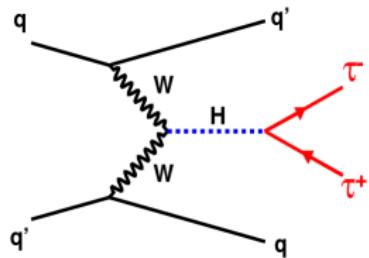
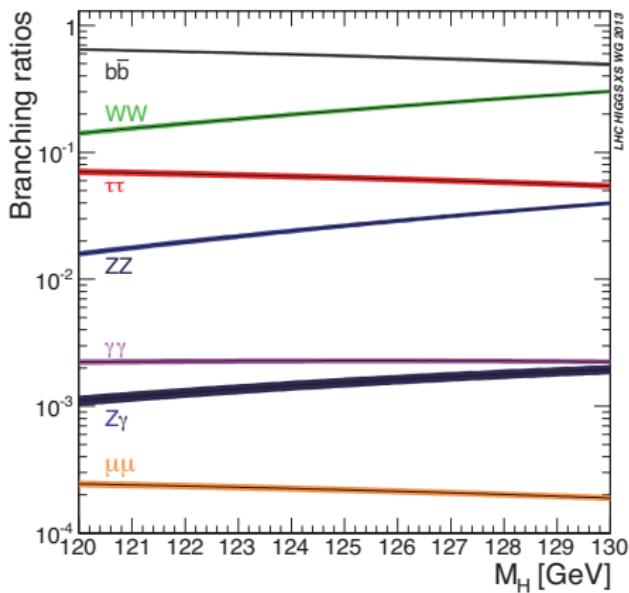
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My work

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My work

- Observation of $H \rightarrow \tau\tau \Rightarrow \text{Run 1} + \geq 5 \text{ fb}^{-1}$
 $\hookrightarrow 3 \text{ to } 4 \text{ fb}^{-1}$ expected in 2015 at best
- Want to detect Higgs decaying into tau leptons
- Essential to understand how tau leptons behave
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 → Studying $Z \rightarrow \tau\tau$ events
- Current work: measuring **tau identification efficiency**
 - Validate expected τ ID efficiency with data
 - Develop better handling of $H \rightarrow \tau\tau$ analysis techniques (eg. dealing with backgrounds)

- **Measuring tau identification efficiency:**

- November: 1st version of τ ID efficiency
 - ↪ Develop specific fit method
- Following months: improvement of efficiency measurement
 - ↪ Using additional data and refining fit method

- **Measuring Higgs coupling to tau leptons:**

- Late 2016: 1st results for $H \rightarrow \tau\tau$ observation
- With 2017 data: more detailed studies enabled
 - ↪ Precision Higgs coupling measurement

- **HiggsTools** contract until April 2017
- Move to **GRK** funding until the end of my PhD
 - GRK 2044: Mass and Symmetries after the Discovery of the Higgs Particle at the LHC
- **Secondments** (still to be determined):
 - Several months at CERN
 - 3 months in a foreign institute
 - 3 months in a company (Shell, Maple, Mathematica)