

Probing new physics at the LHC: searches for heavy top-like quarks with the ATLAS experiment

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Bellaterra, 28th of February, 2014

Outline

Introduction

Theoretical framework

The ATLAS experiment at the LHC

Monte Carlo simulation

Event reconstruction

Searches for vector-like top partner pairs in the single lepton channel

Search for $T\bar{T}$ decaying to $Wb + X$

Search for $T\bar{T}$ decaying to $Ht + X$

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Standard Model as an effective theory

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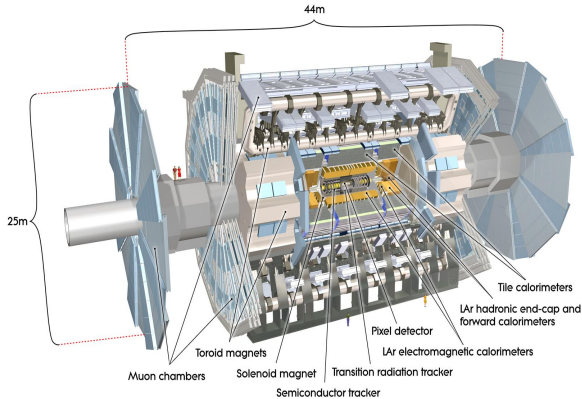
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The ATLAS Detector

A general purpose experiment

- ▶ vertex detector and central tracker
- ▶ superconducting solenoid
- ▶ electromagnetic and hadronic calorimeters
- ▶ muon spectrometer
- ▶ superconducting toroids
- ▶ high hermeticity (full ϕ and $|\eta| < 5$)

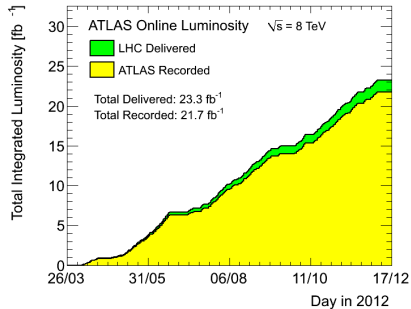


The ATLAS Detector

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In 2012 21.7fb^{-1} collected at $\sqrt{s} = 8\text{ TeV}$!



See [ATLAS public page](#)

Will present results obtained with 14.3fb^{-1} of 2012 data

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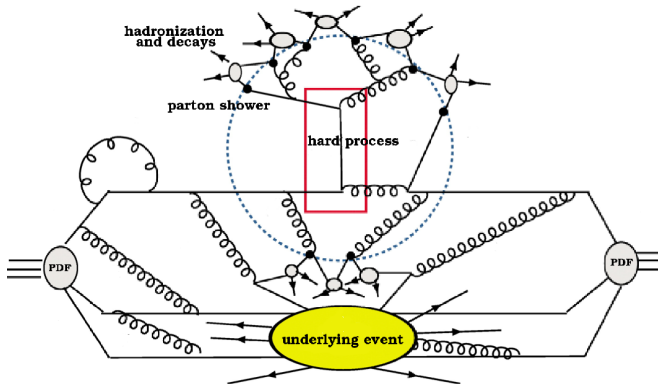
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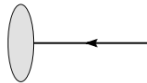
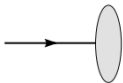
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Modelling of hadron collisions

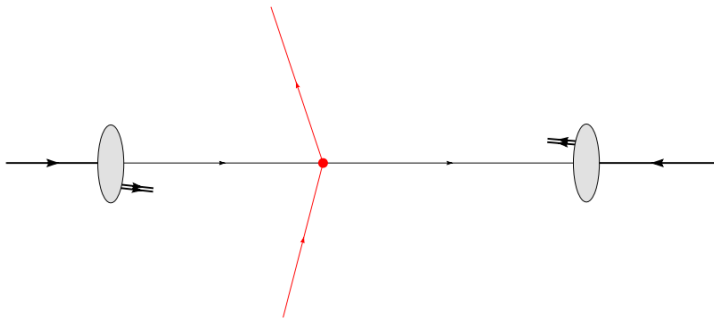
want to do physics at hadron collider?
need a good understanding of incoming hadrons



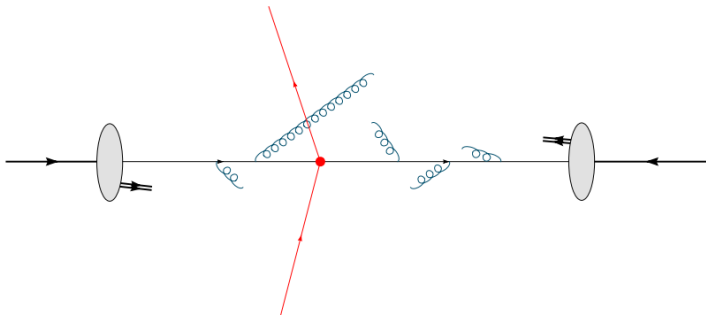
Modelling of hadron collisions



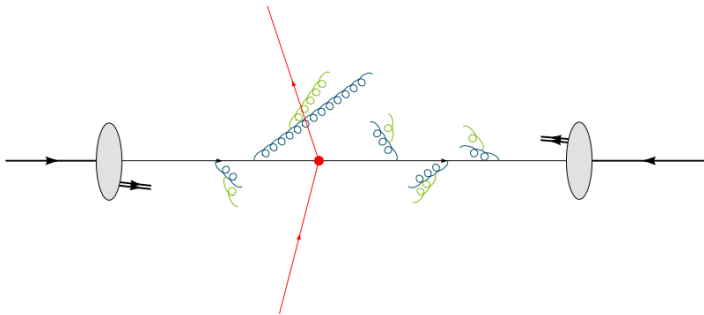
Hard scattering of two partons



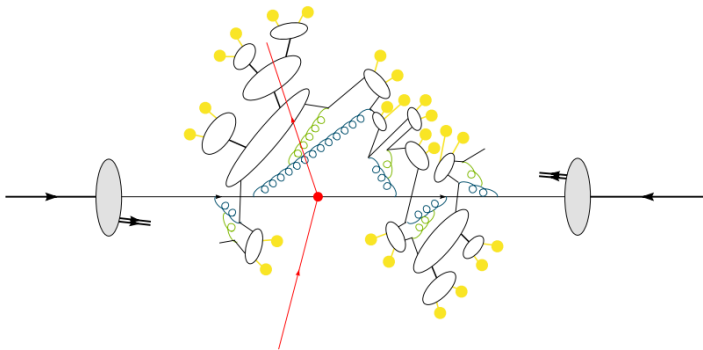
Parton showering



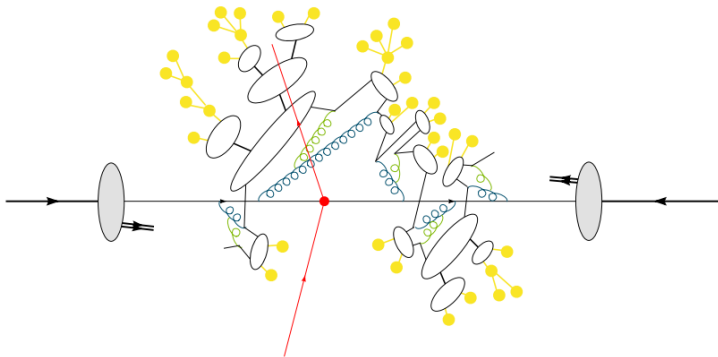
Parton showering



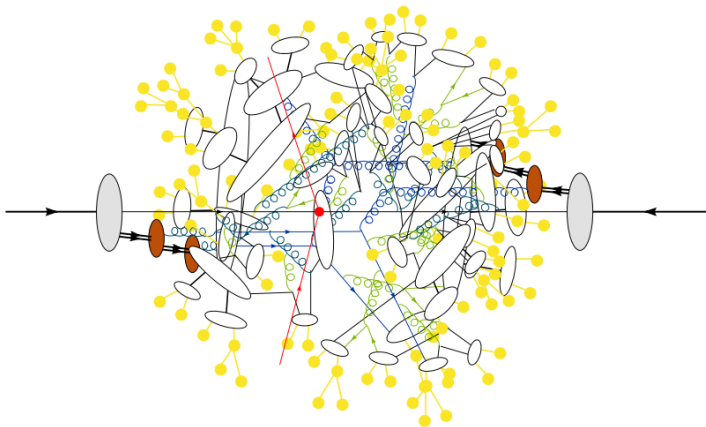
Hadronization



Final particle decays



Underlying event simulation



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