

Updating ATLAS measurements with 13 TeV data

ATLAS W path <https://atlas.physicsmasterclasses.org/en/wpath.htm>

- by Dresden group
- For high school students
- 2 tasks:
 - W^+/W^- ratio from single W events
→ determines the composition of the proton
 - search for the Higgs in WW → $\ell\nu\ell\nu$ events
- Uses Minerva event display
- 1.154 fb⁻¹ 7 TeV data (2011)
- xml format
- [Data selection](#)
- 12,000 events
 - 1000 WW, 3600 W+, 2400 W-, 5000 Bkg

ATLAS Z path <https://atlas.physicsmasterclasses.org/en/zpath.htm>

- by Oslo group
- For high school students
- tasks:
 - Students identify dileptons, diphotons, or 4- ℓ events
 - Build invariant mass distributions → identify known particles and discover new particles (Z', Graviton)
- Plans to extend the tasks!
- Uses Hypatia event display
- 8 TeV data (2012)
- <http://urn.nb.no/URN:NBN:no-51644> (appendix C.3)
- xml format
- 37,000 events

Citizen Science Project

<https://www.reinforceeu.eu/demonstrators/search-new-particles-lhc>

- by Chr. Kourkoumelis et al.
- For Citizens
- Hypatia App
- Build upon HiggsHunters project
- Tasks:
 - Select tracks
 - Calculate invariant masses →
aggregation of data from thousands
of Citizen Scientists will produce
histograms which can indicate the
possible existence of new particles

ATLAS Open Data Portal <http://opendata.cern.ch/>

- by ATLAS Open Data group
- For high school, undergraduate and postgraduate students
- Range of tasks
- 10 fb⁻¹ 13 TeV data + 1 fb⁻¹ 8 TeV data

Possible routes for development of MClasses

Data

- Update to 13 TeV data
- Harmonize data samples and formats

Tools

- event displays online/App

Tasks

- Introduce more tasks and concepts