Cristina Alexe (she/her)

alexe.cristina99@gmail.com

PhD student with the CMS experiment

Bachelor + Integrated Masters (4 yrs) in
Theoretical Physics from the University of Manchester, UK

- I always knew I want to do research, but didn't choose an area of interest until the final year

- Master thesis in Particle Physics about the theoretical and experimental side of CP violation in decays of charm quarks

→ I liked the experimental side the most

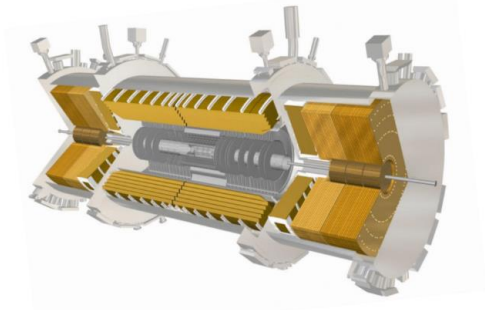
Doing a PhD

- Applied for PhD positions in HEP-ex with preference for Physics analysis, but no particular topic in mind

- Sent ~ 10 applications across 7 countries, got 2 positions
  → check inspire/jobs, university webpages, social media

- DESY Summer Student in 2022, online
  → studied the electromagnetic energy resolution of the ATLAS detector in a data-driven way

EM energy resolution studies with the ATLAS detector



Cristina-Andreea Alexe

Summer Student Presentations 2022

Supervisors: Ludovica Aperio Bella
Filip Nechanský
Craig Wells

Now 2nd year PhD student at Scuola Normale Superiore & INFN in Pisa, Italy

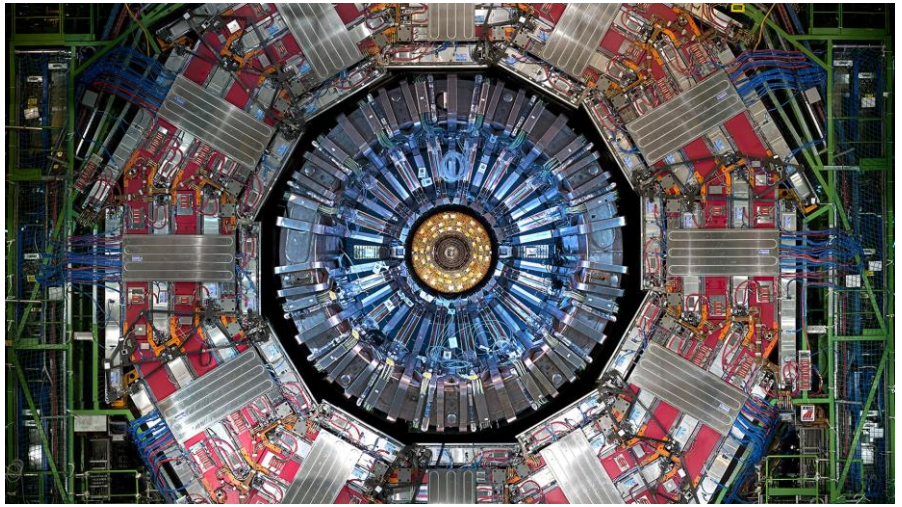
- Working on the CMS experiment at CERN
- Project funded by an ERC grant, research full time, no teaching obligations
- Involves travelling to schools and presenting my work at conferences

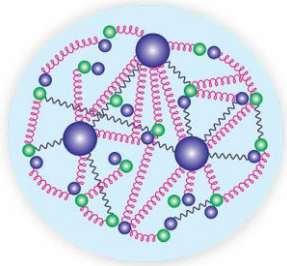
My research

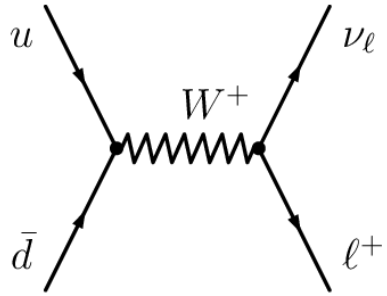
- CMS is a general purpose detector on the LHC ring
  → designed to detect muons very accurately
  → most powerful solenoid magnet ever made

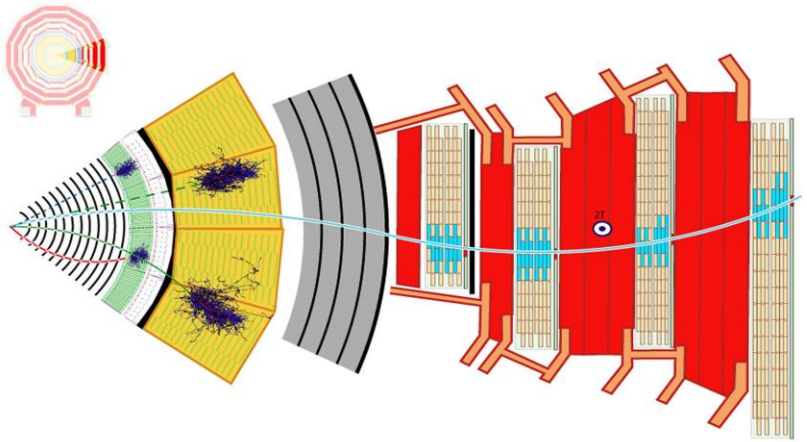
- The W boson mass is a fundamental parameter that can be measured at CMS, challenged by:

1) Only the muon from the W decay is detected → precise momentum calibration
2) Need to know the initial state of the W → need precise parton distribution functions





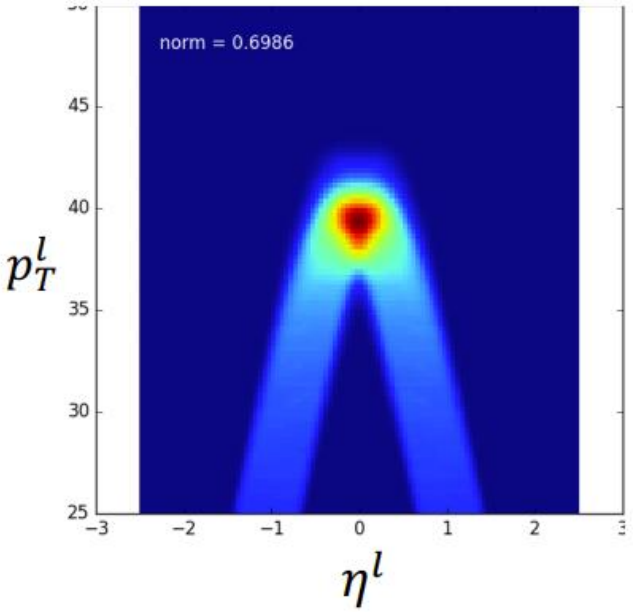




Financial support from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (Grant agreement N. 10100120)

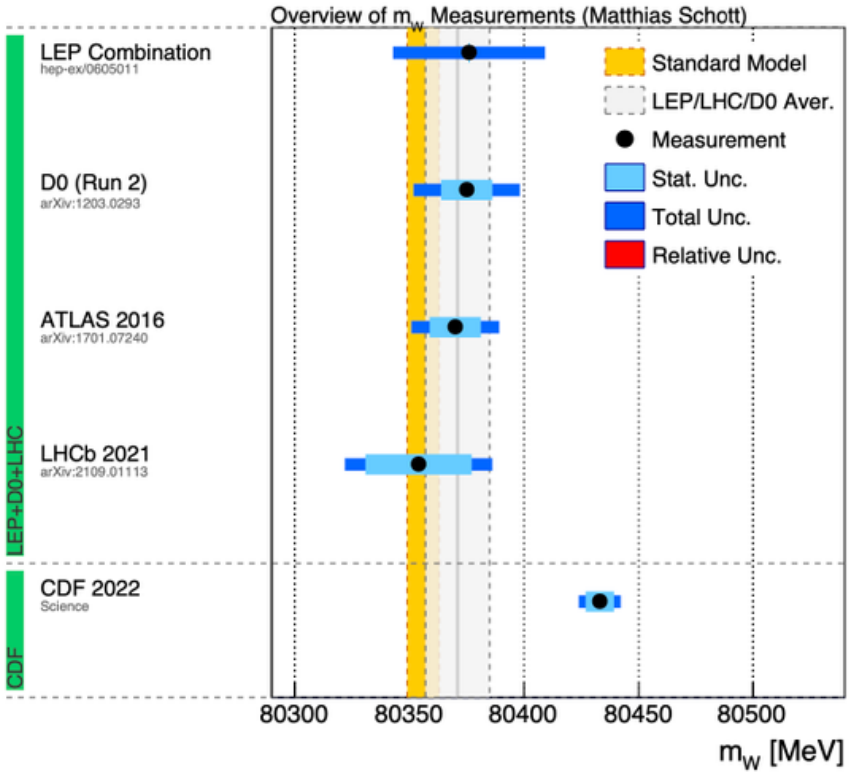
ASYmptotically MOdel-independent measurement of the W boson mass (ASYMOW)

- My PhD project: a theory agnostic measurement of mW, reduces the impact of uncertainties from PDFs by exploiting the large statistics at LHC



- Extract mW from template fits to muon distributions, learning about W production from the muon angular distribution

- Unexpected effect of statistical nature detailed in a separate publication



- I worked on applying some techniques from the precise muon calibration designed for mW and made a tool that improves the measurement of the momentum of muons for any analysis at CMS

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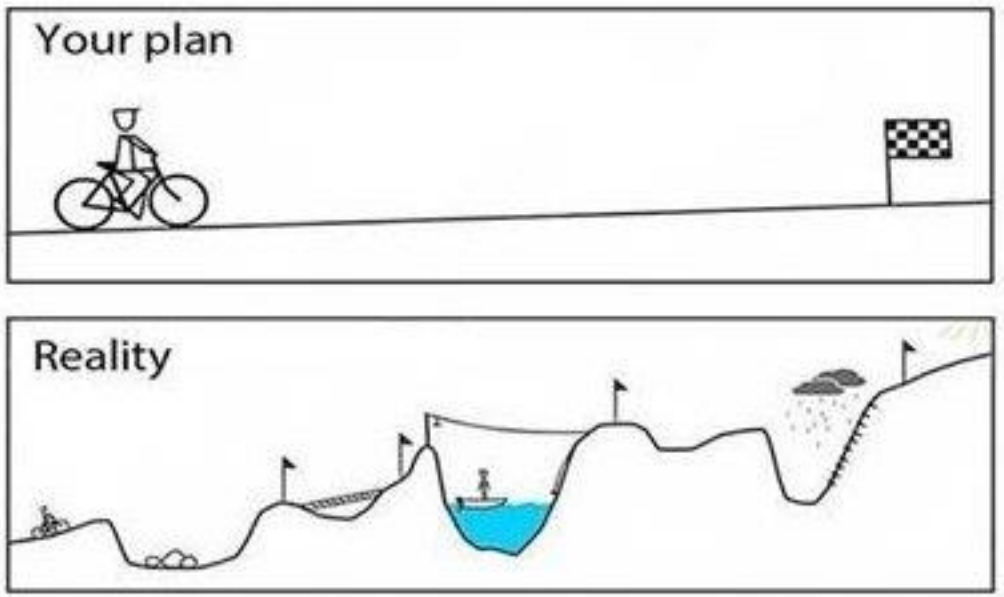
Take-home message

- Reach out to people, ask questions about Physics / career advice
  → people are usually excited to see interest
- Ask yourself what you want to do and be honest to yourself / your supervisor
- Enjoy the DESY Student program!



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