

# Switching from Academia to Industry

My journey from particle physics to Data science

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- Research at CERN
- Leaving academia; The dilemma and the options
- PhD skills for industry jobs
- Which industry job suits you?
- Tips for being better prepared



**Academia**

# My journey



B.Sc Physics (AUPh)

M.Sc Computational Physics (AUPh)

Ph.D Experimental Particle Physics (UGA - CERN)

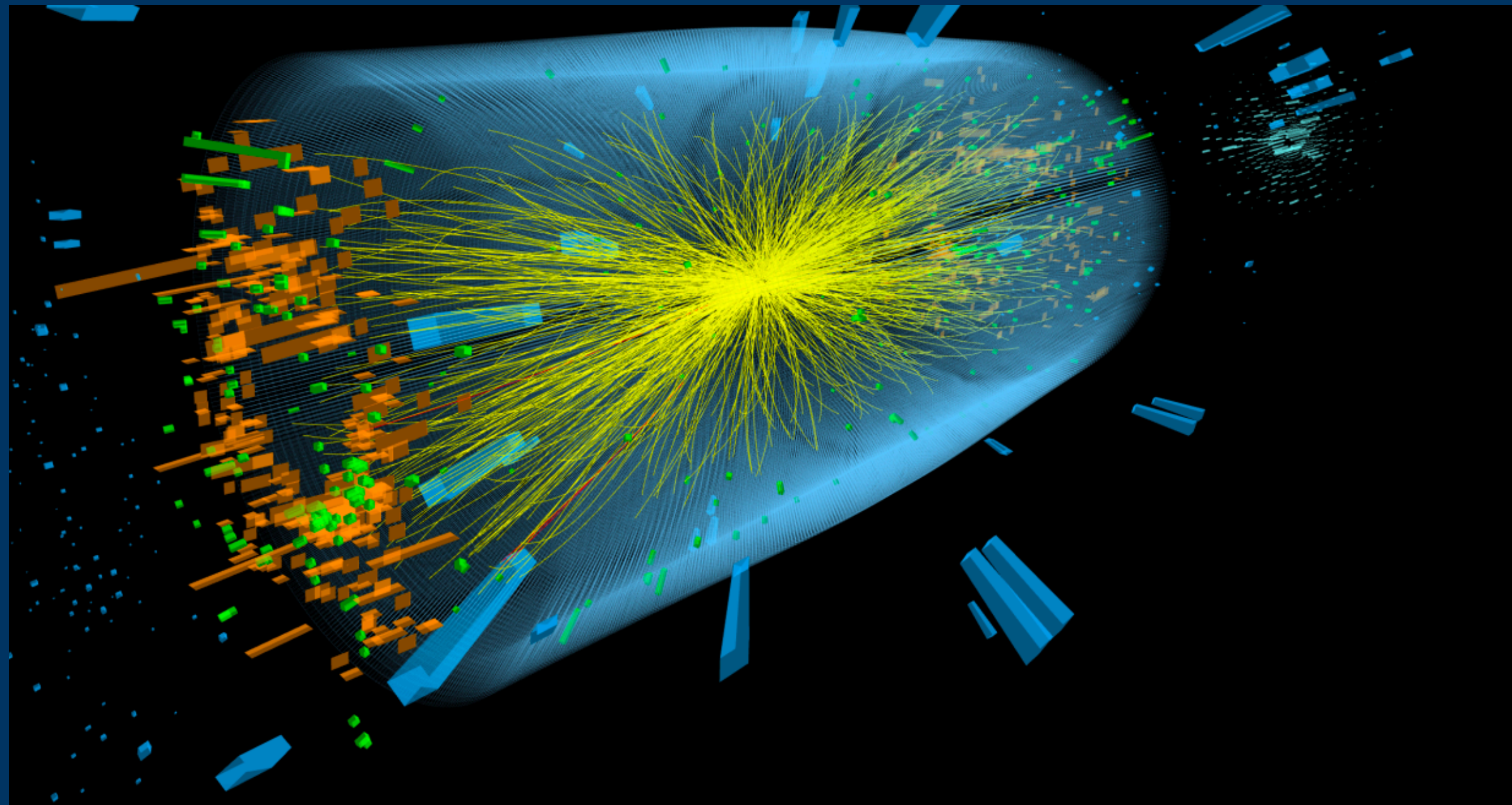
~~PostDoc ....~~

Data Scientist (AdTech)



# Research at CERN

(European Organization for Nuclear Research)



To test our best theories about the fundamental structure of our universe, CERN has build a massive particle collider which generates an enormous amount of data:

~1 billion of collisions/second -> 1PB of collision data per second

Hundreds of different processes happening all at once

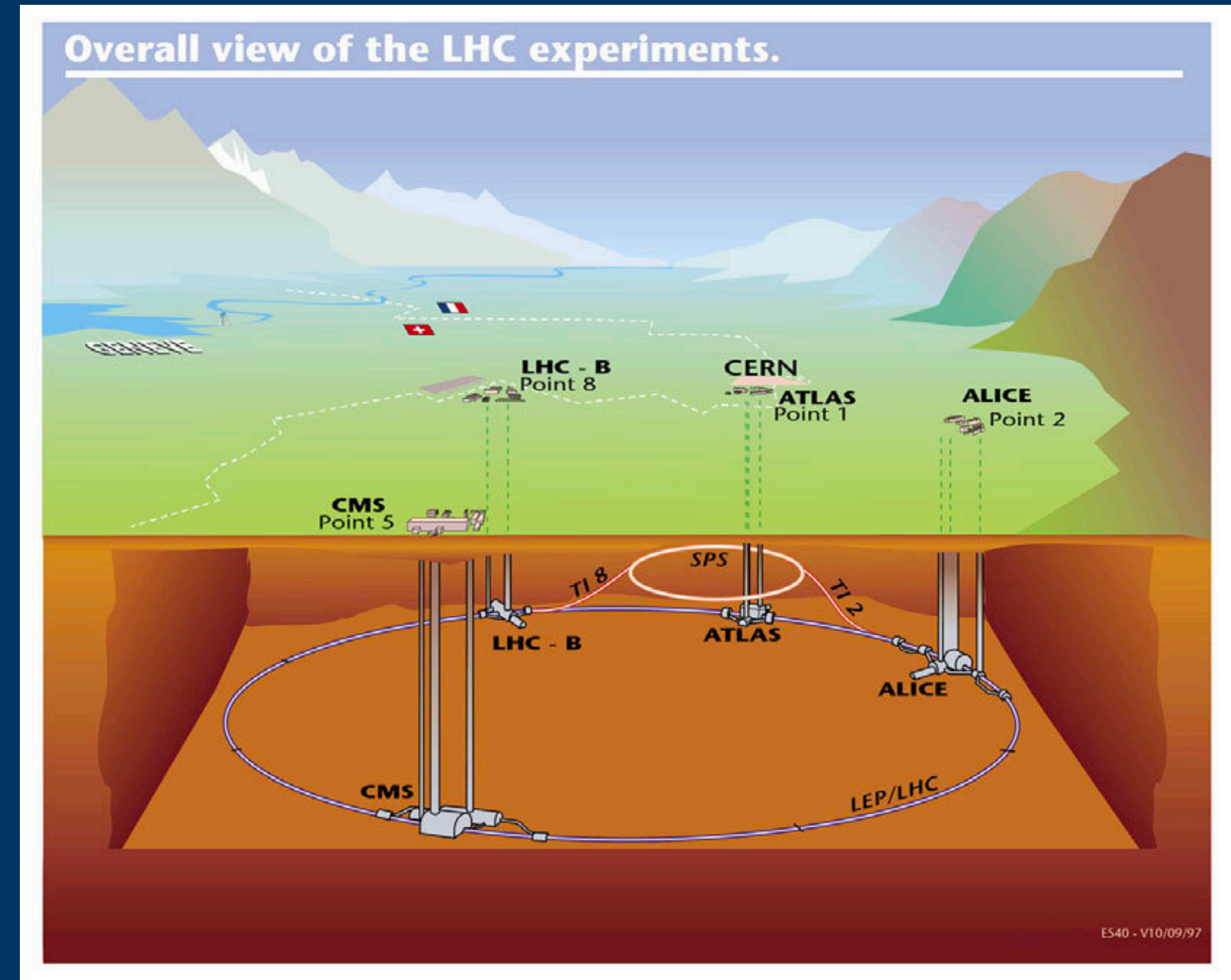
Challenge for researchers: Extract the signal they are interested in by eliminating the background noise



# Research at CERN



is located on the border of France and Switzerland



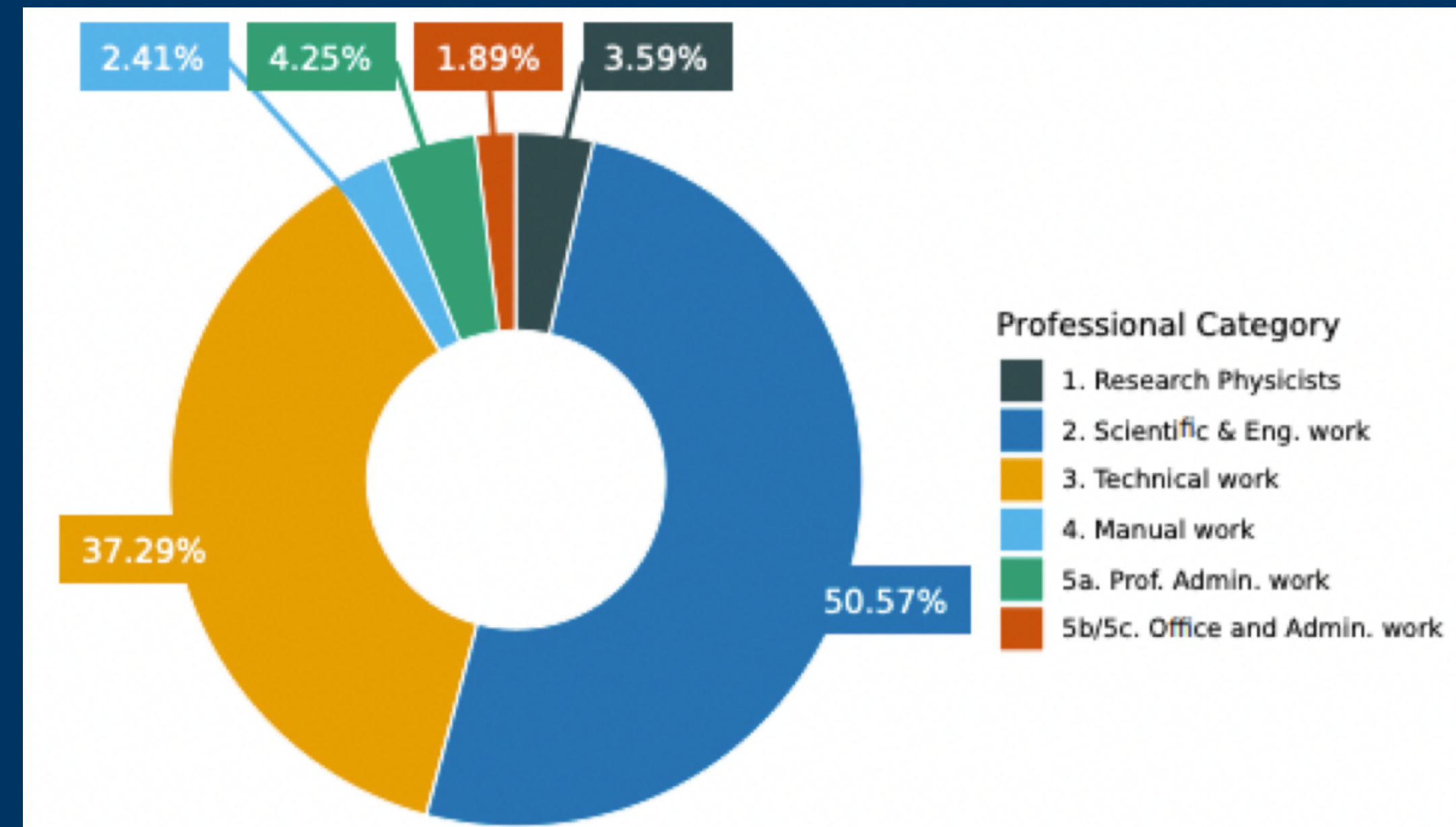
CERN involves around 17k people

# Research at CERN

At CERN, the primary focus is physics, but physicists are the minority!

Other fields:

- Computer Science
- Engineering
- Medicine
- Environmental protections



# Important discoveries at CERN

Physics related:

- Discovery of the Higgs boson (2012)



Non-Physics related:

- Development of the World Wide Web (1989)

2013 NOBEL PRIZE IN PHYSICS  
**François Englert**  
**Peter W. Higgs**



© The Nobel Foundation, Photo: Lovisa Engblom



F. Englert and P. Higgs  
Photo: Wikimedia Commons

### 2013 Nobel Prize in Physics

The Nobel Prize in Physics 2013 was awarded jointly to François Englert and Peter W. Higgs "for the theoretical discovery of a mechanism that contributes to our



Big Bang

10<sup>-11</sup> seconds

Time

What Happened after the Big Bang?



### Announcements of the 2013 Nobel Prizes

Physiology or Medicine:  
Announced Monday 7 October

Physics:  
Tuesday 8 October, 11:45 a.m. CET at the earliest

Chemistry:  
Wednesday 9 October, 11:45 a.m. CET at the earliest

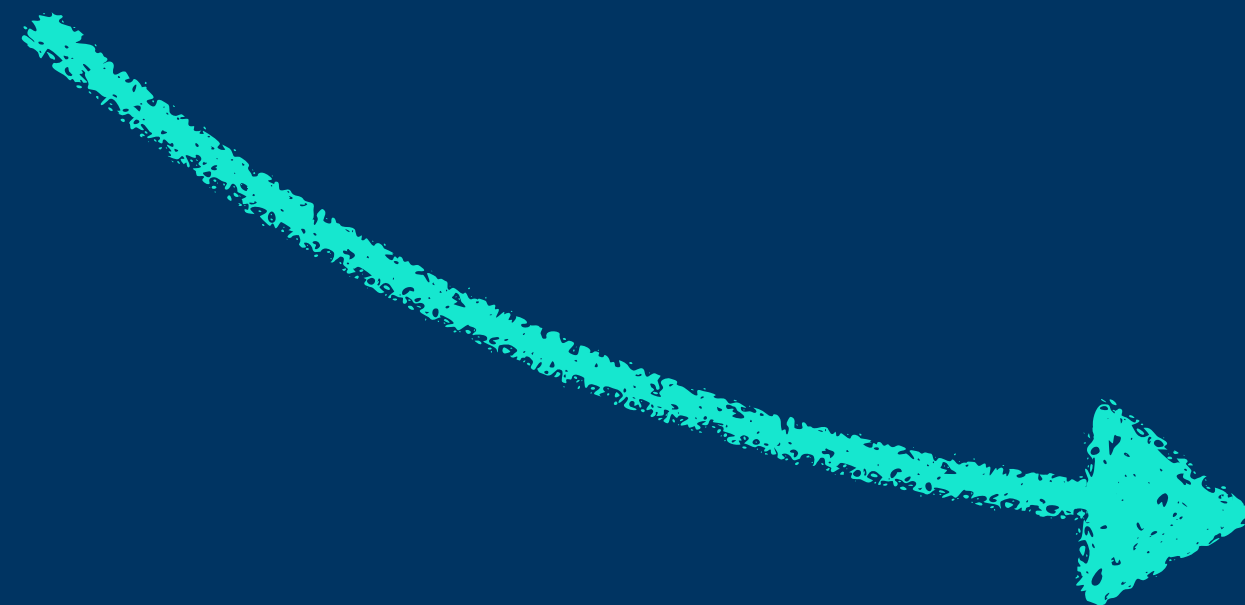
Literature:  
Thursday 10 October 1.00 p.m. CET

Peace:



# My research at CERN

- Working at ATLAS experiment
- **Analyze** experimental **data** in the search for evidence of new physics
- Use **Machine learning models** in order to distinguish signal from background events
- Build **statistical models** to account for detector effects that interfere with the output

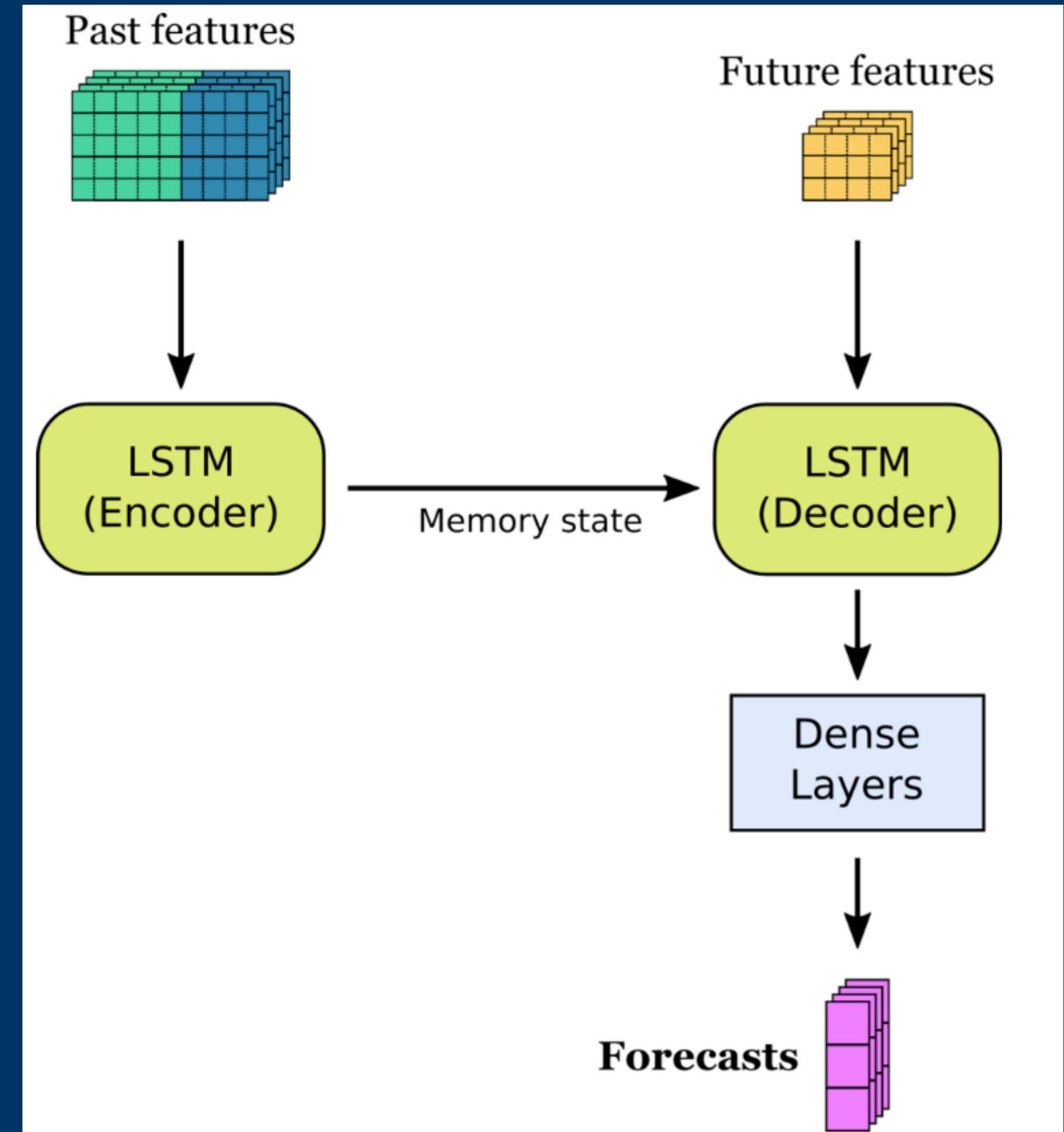
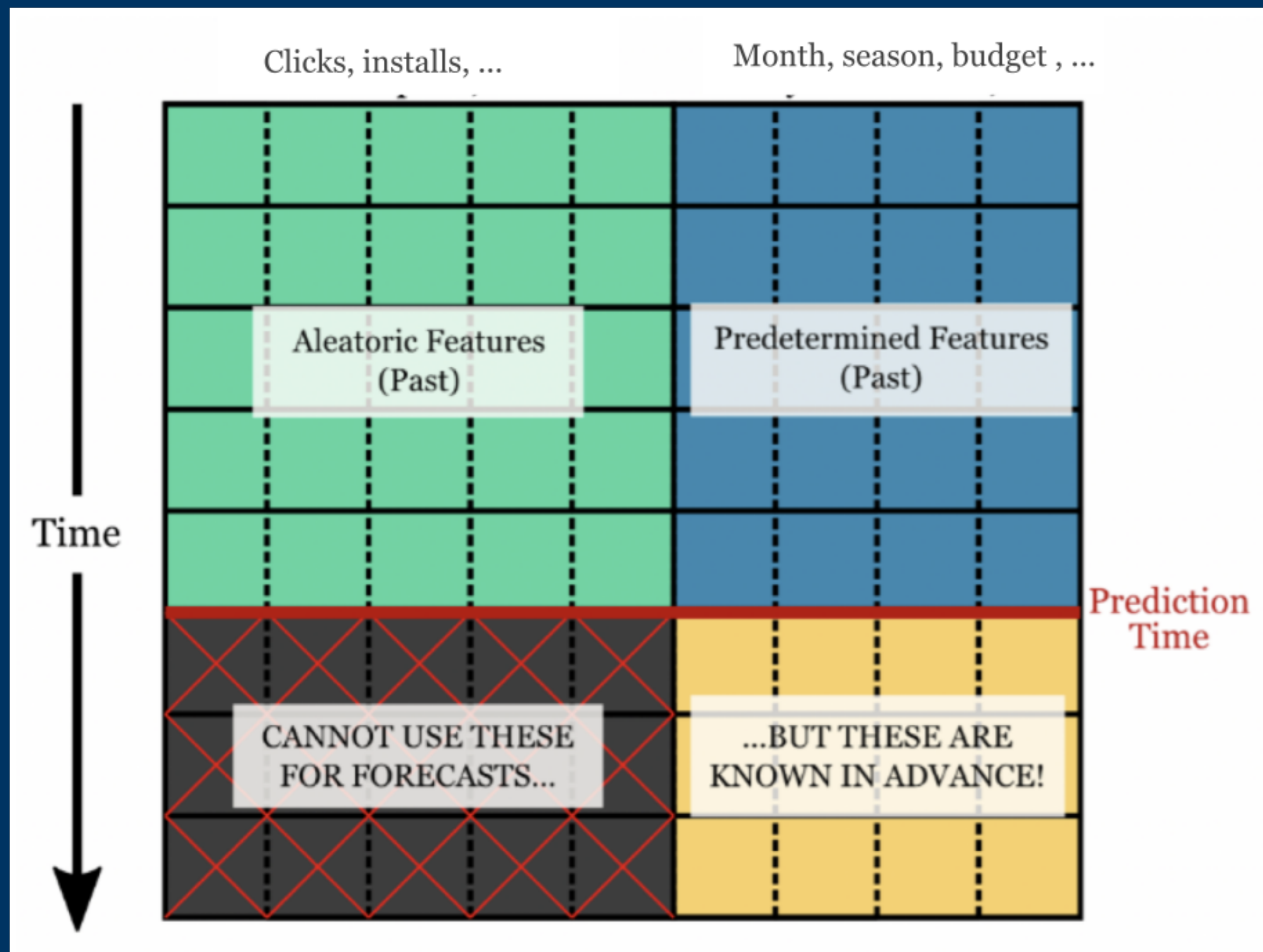


So kind of an industrial  
“**Data scientist**” profile

**Industry**

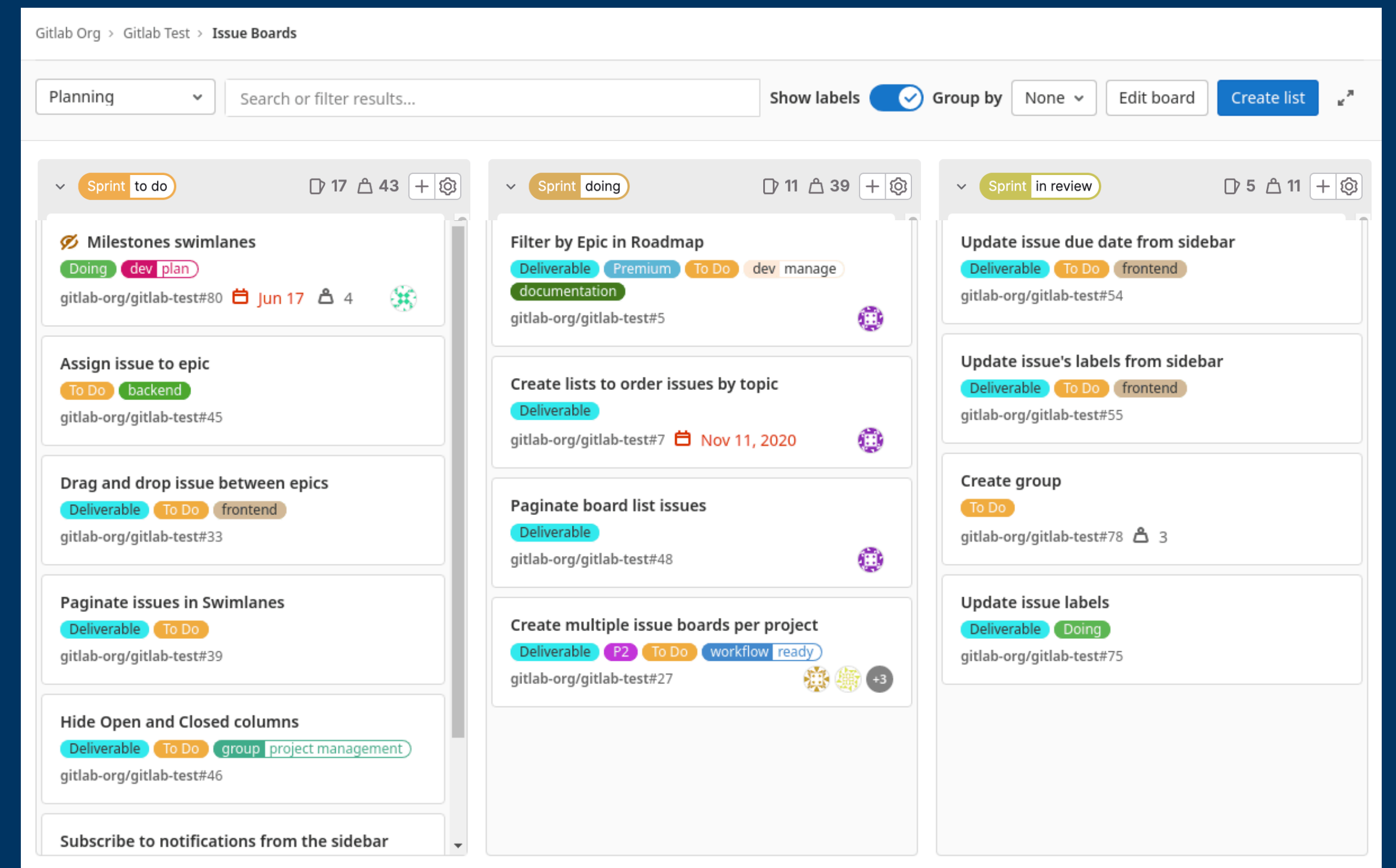
# My research in industry

- Time Series forecasting using Neural Network
- Purpose: Predict future revenues
- Based on Encoder-Decoder architecture



# Industry workflow

- Oftentimes there are meetings with product, business or other tech people
- Projects are typically divided into small tasks whose status has to be reported frequently
- Organisation and splitting of task is done with the help of “boards”
- Project decisions are taken after discussions between tech+product+business teams. However, the tech team is fully in charge of the technical approach
- Co-working and open-space offices are common, but also many employees are fully or partially remote



To leave or not to leave?

# Why might you hesitate to take on an industry job?



- Academics often look down on industry jobs
- It is an unknown world that you never experienced
- It is all about money
- There is no solidarity among colleagues
- There is a lot of time pressure

# Leaving academia

Why may you want to move?

- Opportunity to work on cutting-edge technology and solve real-world problems
- Opportunity for career advancements and leadership roles
- Opportunity to apply your skills in a different and more challenging environment
- Higher salaries and other benefits

# Contra leaving academia

Why might you want to remain in academia?

- You do not like the stress of competing and continuously trying to catch up with new technology
- Teaching & mentorship opportunities: mentor and train students, you enjoy teaching and sharing knowledge
- You can work on things that aren't (yet) profitable, but may be super interesting still
- You prefer not to rush on your research/projects: less strict deadlines



# Academia vs Industry

- **Research focus:** oftentimes the driving force is if the project is publishable
- **Research pace:** take a rigorous and methodical approach
- **Variety:** usually focusing on one given project for years in order to build expertises
- **Carrier progression:** ranks of professorship
- **Collaboration:** normally among scientists of the same/similar domain

- **Research focus:** focus on developing and commercialising products & technologies, applying science to solve problems in the marketplace
- **Research pace:** you have to adjust and pivot to changing conditions
- **Variety:** typically altering projects
- **Carrier progression:** management / leadership roles
- **Collaboration:** with variety of experts (business, product, engineers, scientist, clients ...)

**Entering the Industry world**

# PhD skills for industry jobs

- Programming skills
- Research and analytical skills
- Communication and presentation skills
- Project management and leadership skills
- Decision-making, problem-solving and trouble-shooting
- Self discipline

# Which industry job suits you?

Role	Key Responsibilities
<b>Research Scientist</b>	Conduct original research in ML and AI. Develop new algorithms, techniques, and models. Improving the performance of existing models.
<b>Data Scientist</b>	Use statistical and machine learning techniques to extract insights from data.
<b>Data Analyst</b>	Extract insights from data using statistical and visualisation tools. Creating dashboards and reports.
<b>Data Engineer</b>	Design, build, and maintain the infrastructure necessary to collect, store, and process large data sets.
<b>Machine Learning Engineer</b>	Design and develop machine learning models and systems. Implement, test and deploy machine learning models to production.
<b>MLOps</b>	Automation of model training and validation processes. Deployment and maintenance of machine learning models in production environments (cloud-based infrastructure).

# Tips

- Try to **translate your experience** into the company's goals and emphasis
- Try to emphasise on **connecting the dots** between your experience and the company's needs
- Talk about your **results** and why they matter
- Usually there is **no need** to include all of your **publications**, awards etc
- Keep your CV short to **one-page** long
- They will spend few seconds glancing at your resume: **keep it simple** with emphasis to what they look for
- Often (especially start ups) present things that do not exist. Be careful on the description. -> Just because a company says they work on fancy topic X doesn't mean they really do (especially if they are startups). **Make sure to ask** what exactly the day-to-day work looks like

# Tips

- Do not wait until your PhD defense to apply for industry jobs
- Internships are the best way to get to know the industrial world and to build your network
- In industry, work experience matters more than titles
- Oftentimes your PhD work is considered as experience (but not always)
- Interviews in industry take longer and they are more intense
- In industry “personality” checks matter a lot

**Thank you & good luck!**