

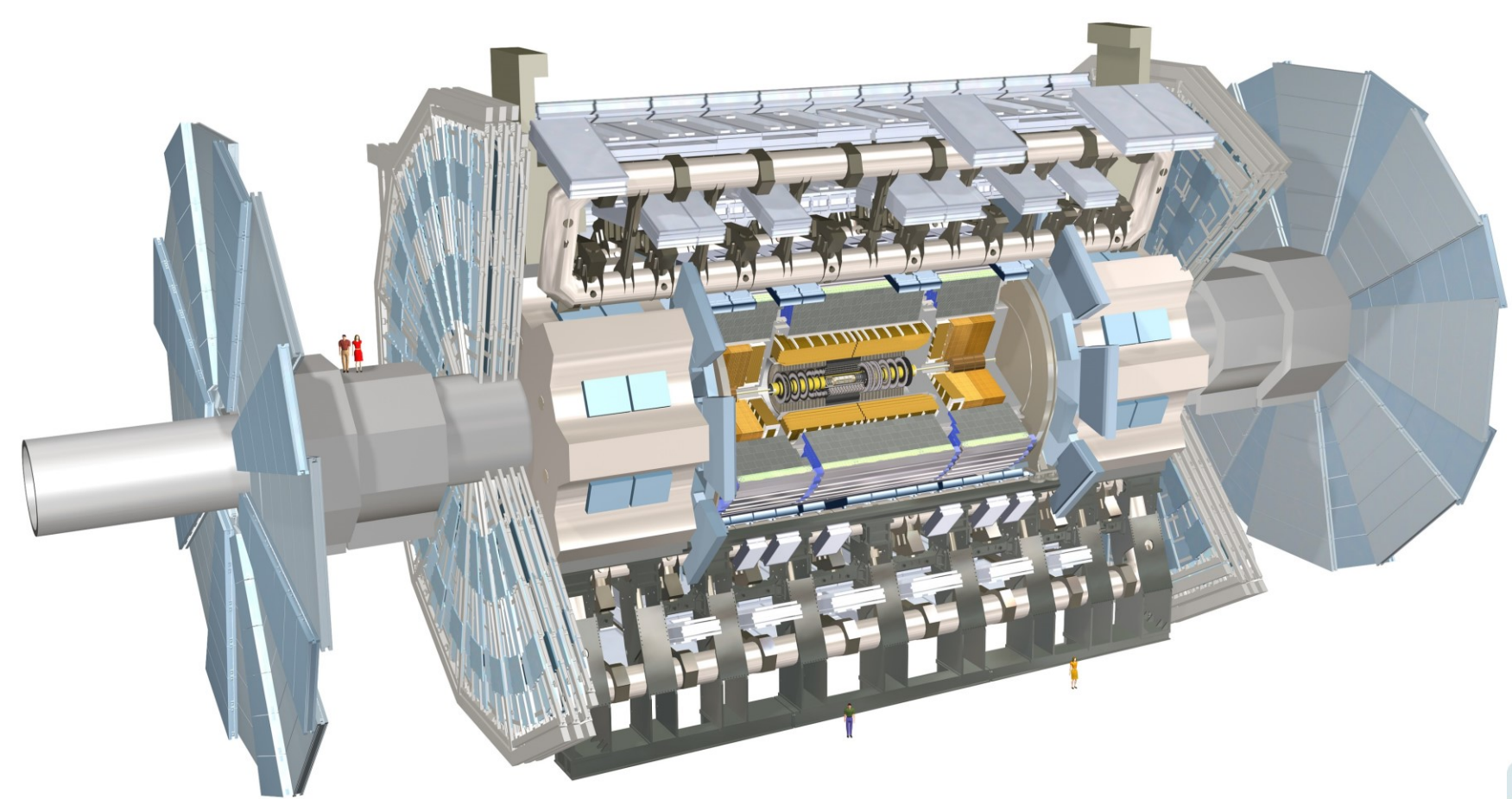


HELMHOLTZ  
RESEARCH FOR GRAND CHALLENGES

# ATLAS

The **Largest** collider detector. Ever!

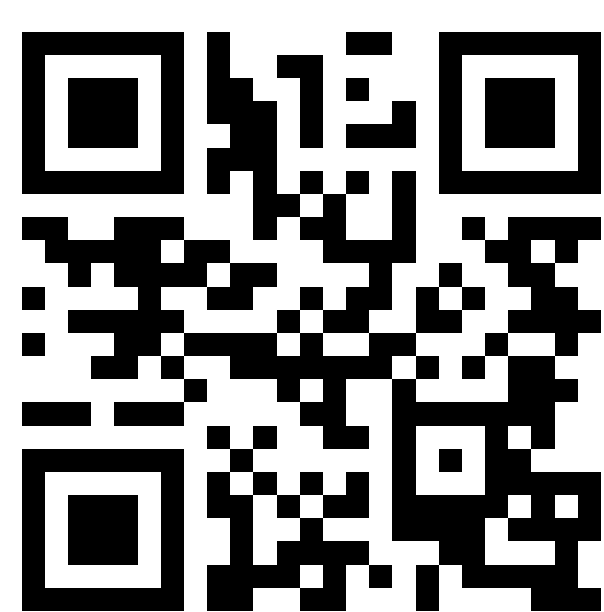
## The Detector



- 46 m long, 25 m in diameter
- 100 m below ground
- 7,000 tons (but would float in water!)



Scan for more!



## The Collaboration

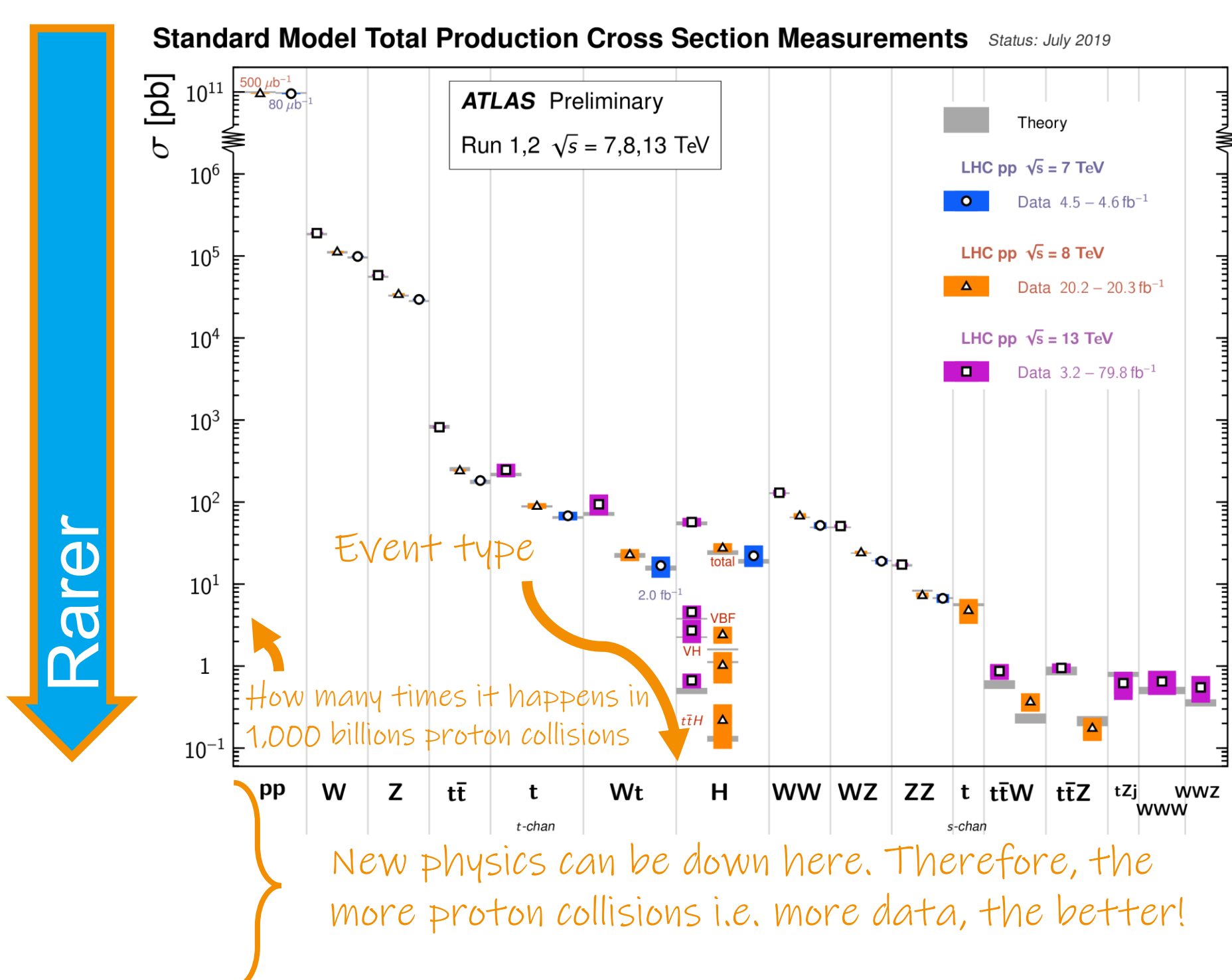
- 3000+ scientific authors
- 183 institutions around the world
- 38 countries

Our group, both in Hamburg and Zeuthen, is part of this!

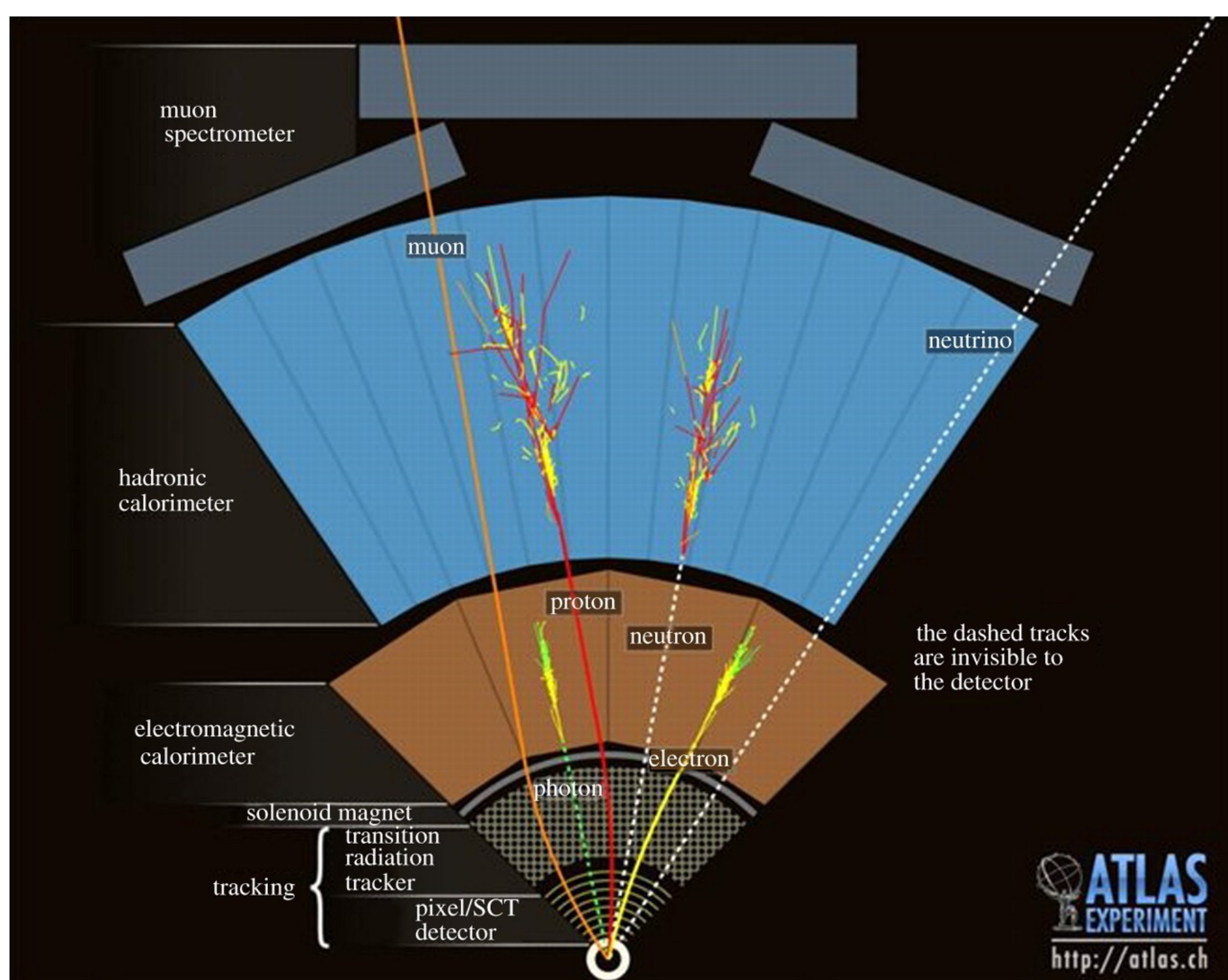


Group outing August 2019, with our awesome summer students

## Hidden treasures



- Subdetectors, assemble!
  - Each of them sensitive to different effects
- We design sophisticated algorithms to reconstruct what happened.
  - Machine Learning used throughout

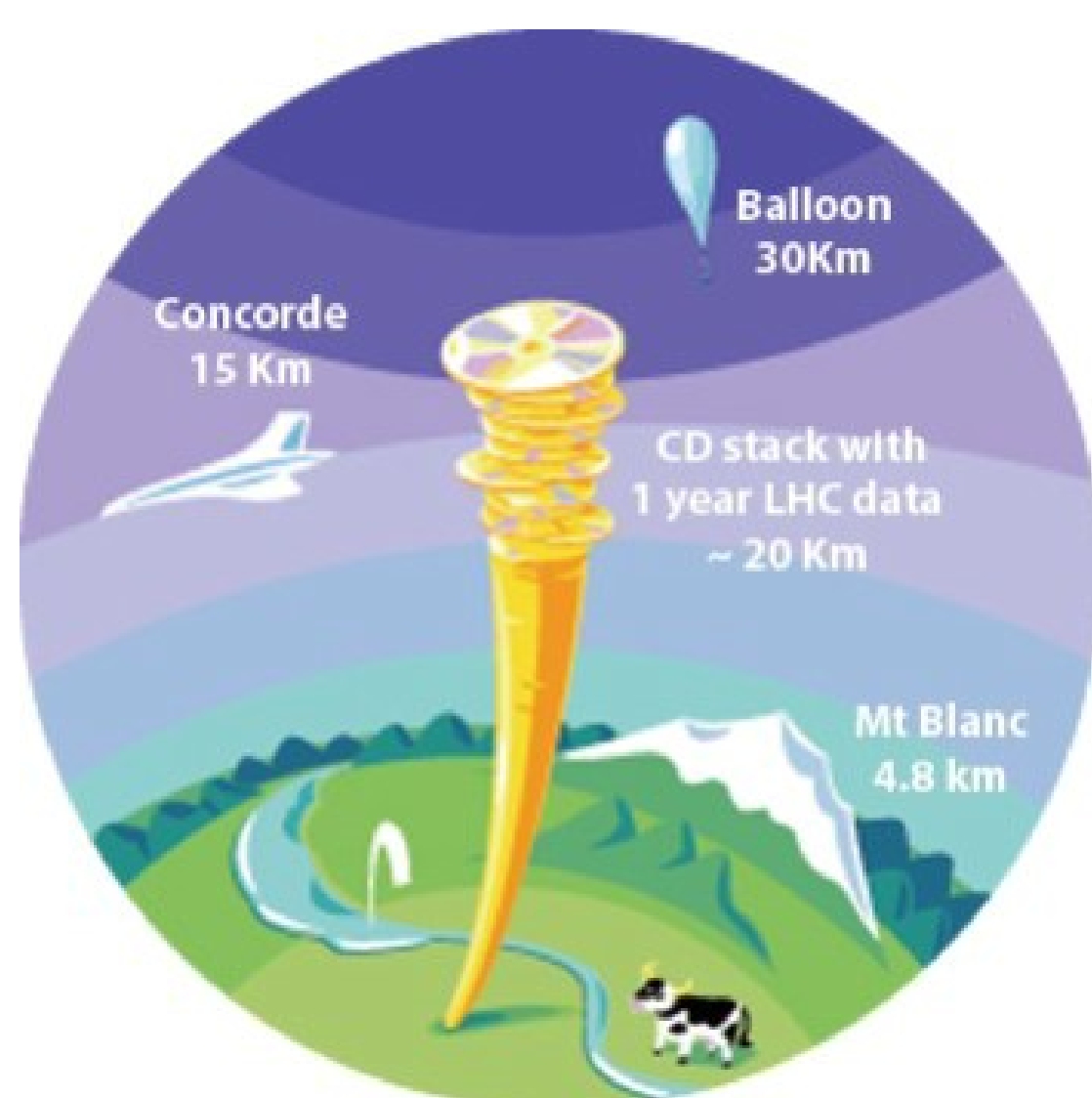
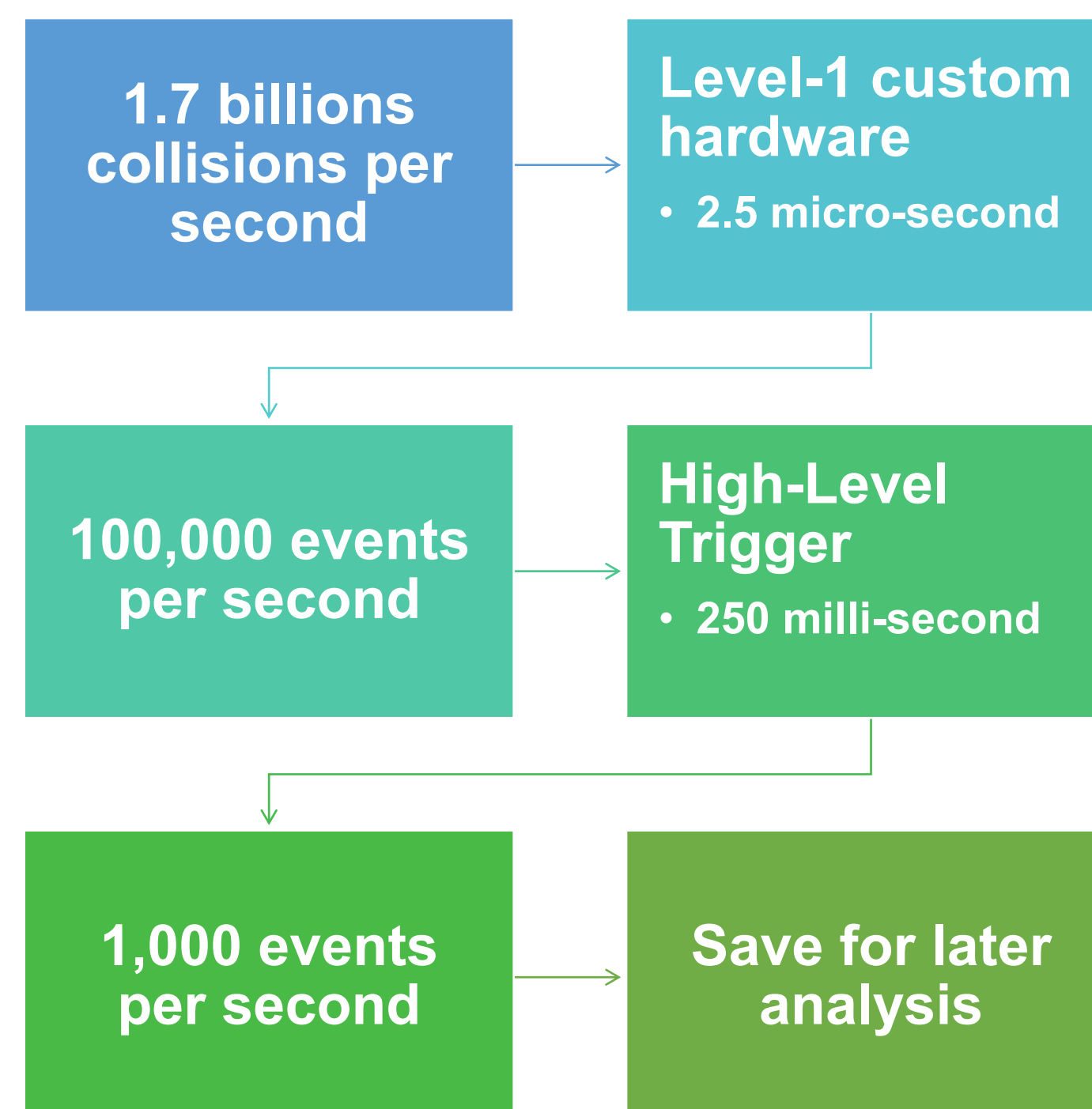


## You want more? We have more!

Check out these posters

- Detector developments
- Precision measurements
- Dark matter and searches
- Higgs physics

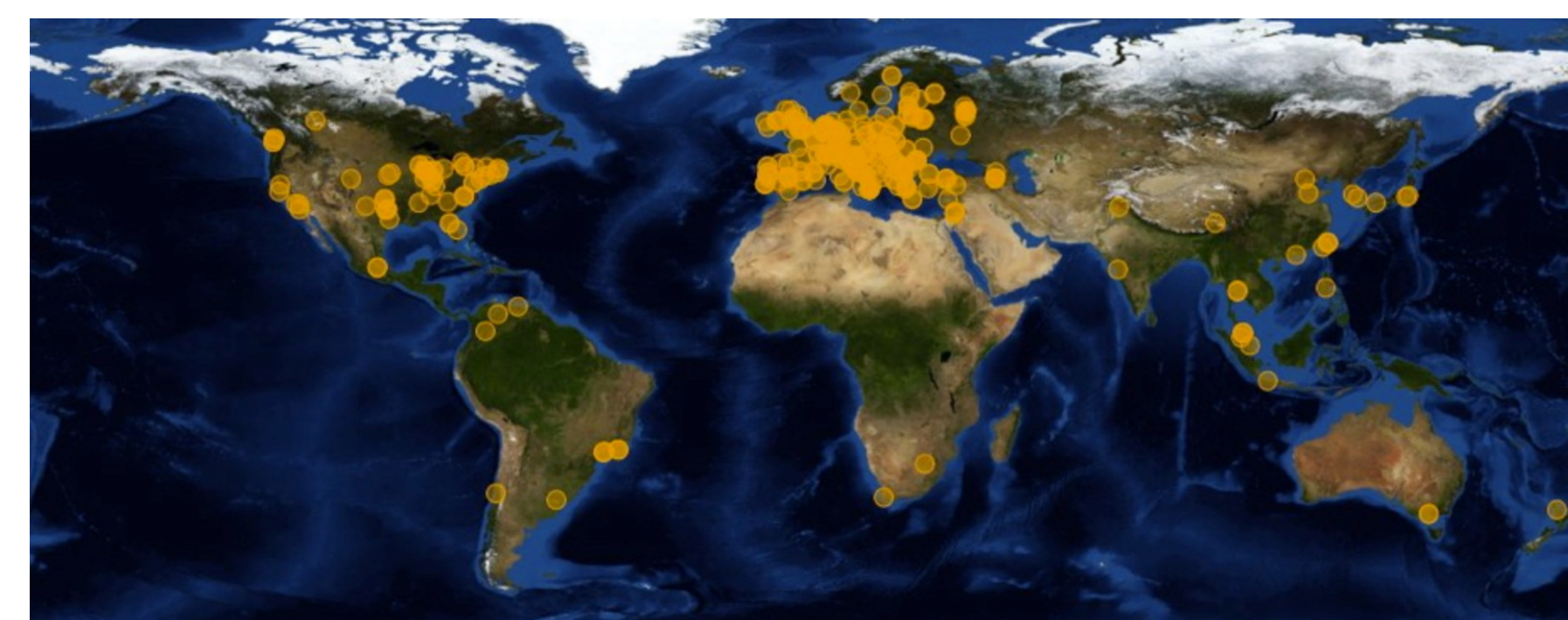
- Study everything from the most common to the rarest phenomena...
- ... while only see the stable particles!



## The Data

- Up to 1.7 billion proton-proton collisions per second!
- Only a few of them are "interesting"
- **Trigger system** to the rescue
  - Reduced to 1,000 events per second

- That is still a lot of data
- LHC experiments generate 35 millions gigabyte per year
  - ATLAS data is a huge chunk of that
  - And they all need backups!



- Data are distributed to the Worldwide LHC Computing grid
  - Over 130 centers around the globe
  - Analyzed by ATLAS members around the world

## Computing

- Want to analyze these mountains of data with our awesome sauce algorithms
- We need computers. Lots of them.



- At DESY, we have the National Analysis Facility, or NAF for short
  - 8000+ CPU cores
  - State-of-the-art tools: GPU, Machine Learning libraries, containers, etc.

- DESY also provide a large pool of resources for the worldwide computing grid
  - And we are using them!
- Both NAF and grid computers are maintained by our friendly IT colleagues

