

A large, complex particle detector, likely the ATLAS or CMS at CERN, with a green metal frame and numerous electronic modules and cables. The detector is situated in a large, industrial-looking hall with high ceilings and bright lights.

# Jobs @ CERN?

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Fysiikan tutkimuslaitos (HIP)*



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[www.hip.fi/summies](http://www.hip.fi/summies)

## ■ Particle physics:

- Higgs physics at the LHC
- Jet physics at the LHC
- Track reconstruction with Machine learning
- Experimental particle Physics in ALICE I & II
- New physics searches with CMS/TOTEM at the LHC
- Open data in teaching and education

## ■ Material science:

- R & D of gas detectors
- CLIC module

## ■ Nuclear physics:

- Research and development for instrumentation in nuclear physics at ISOLDE

## ■ Mechanics:

- Engineering (Mechanical, Materials, Aeronautical)

## ■ European Synchrotron Radiation Facility ESRF (Grenoble, France):

- Research at the synchrotron light source ESRF ([www.esrf.eu](http://www.esrf.eu))

## SUMMER JOBS @ CERN

organized by Helsinki Institute of Physics

#Higgs

#Quarks

#Jets

#SuperSymmetry

#ParticlePhysics

#NuclearPhysics

#HeavyIons

#Technology

#MachineLearning

#OpenData

#Engineering

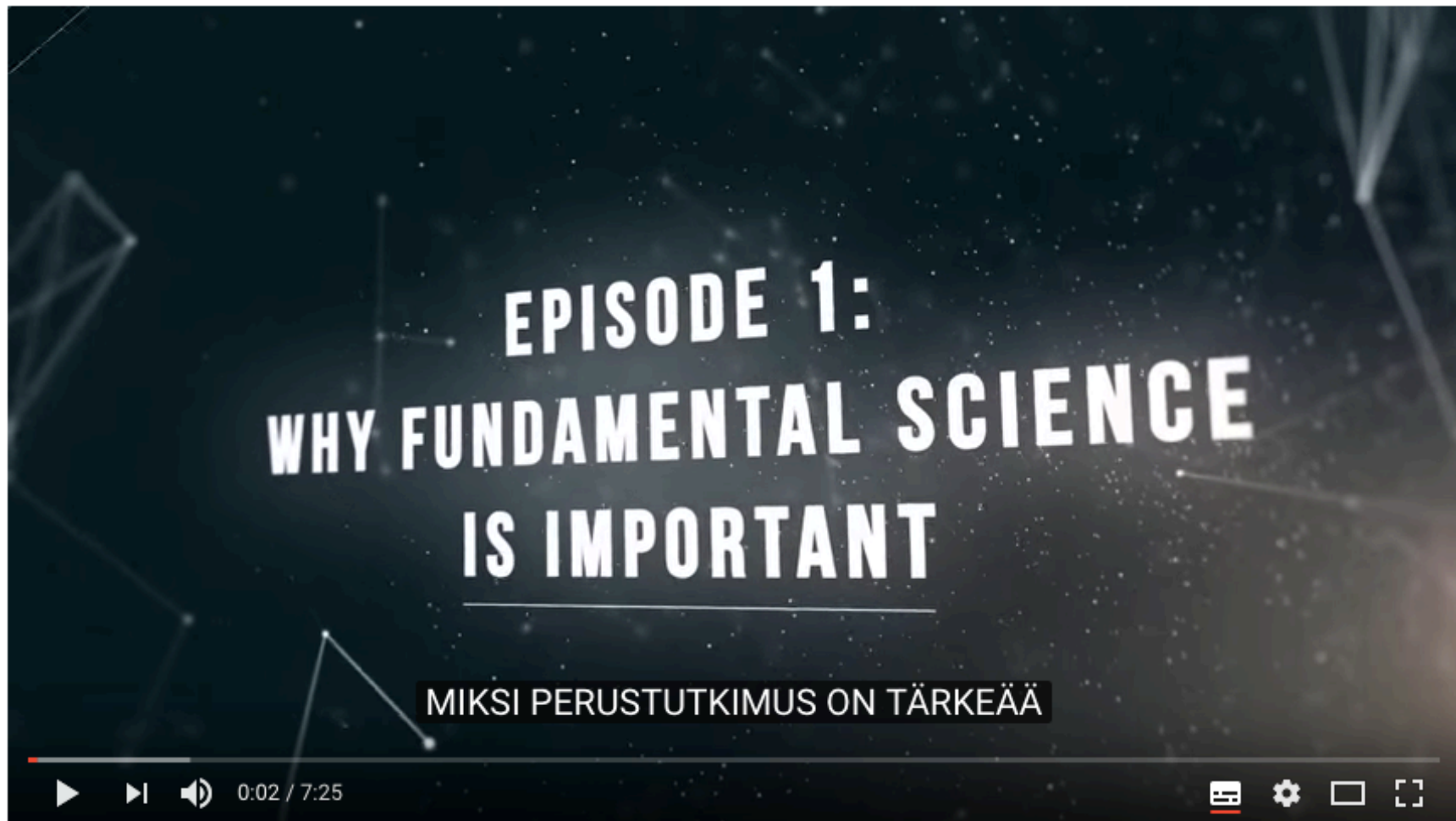
#Instrumentation

#TechnologyTransfer

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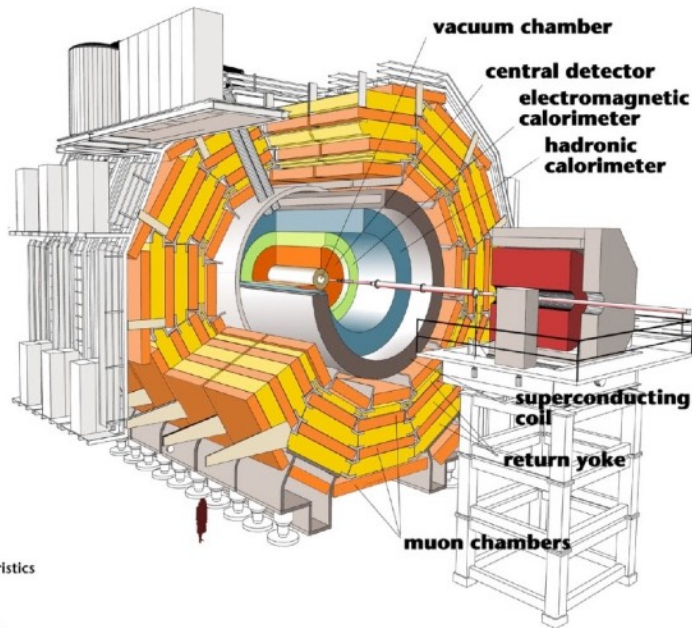
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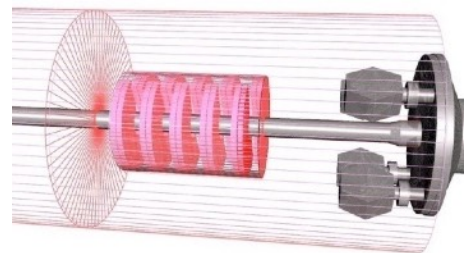
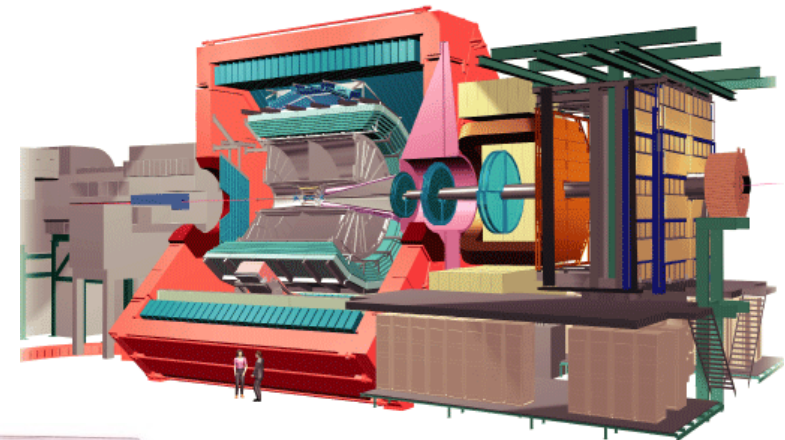
- **LHC** is the worlds largest particle accelerator located in **CERN**
- Helsinki Institute of Physics **HIP** is the link between CERN and Finland ([www.hip.fi](http://www.hip.fi))

- HIP is part of three LHC experiments
  - CMS
  - ALICE
  - TOTEM
- HIP takes i.a. part in ISOLDE, CLIC and technology projects



Detector characteristics

Width: 22m  
Diameter: 15m  
Weight: 14'500t





- **CMS collaboration:** about 200 universities and institutes from 46 different countries.
- Over 3500 physicists, engineers and students



## ■ ...charged Higgs bosons

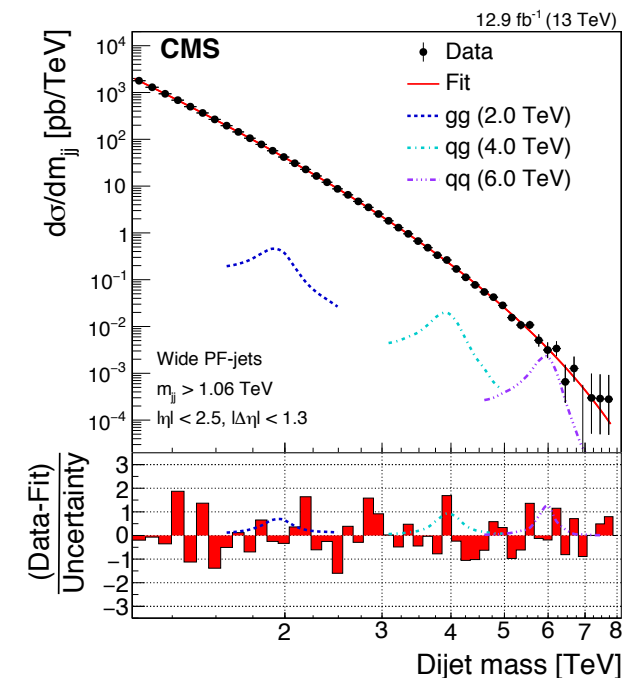
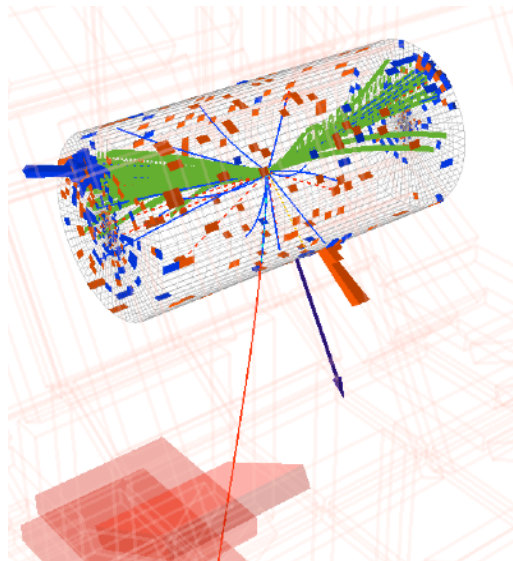
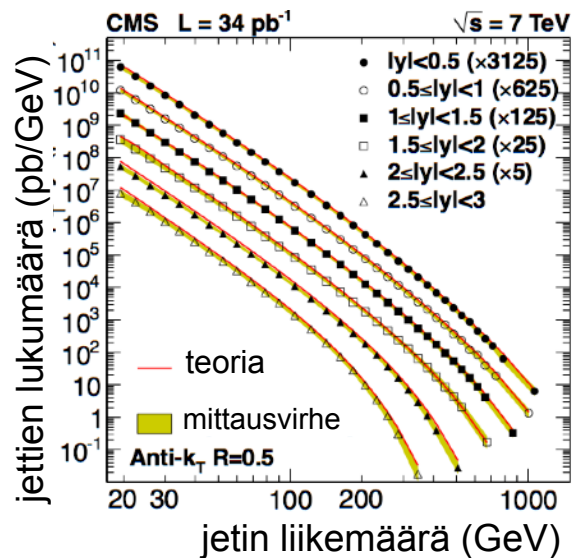
- Develop analysis techniques to observe a new particle

## ■ ...sprays of particles or jets

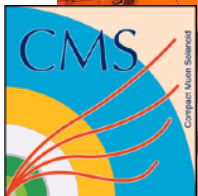
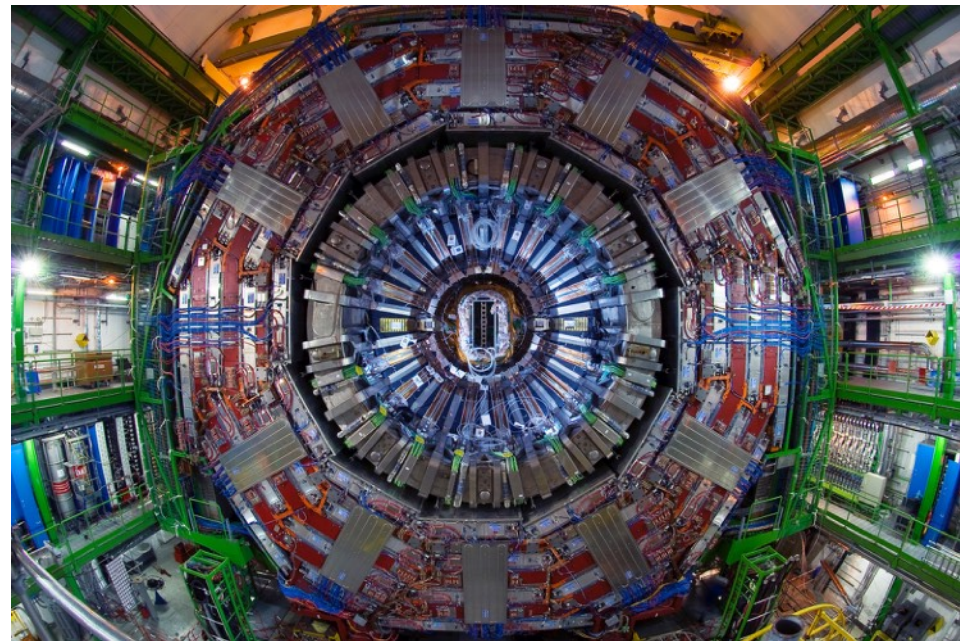
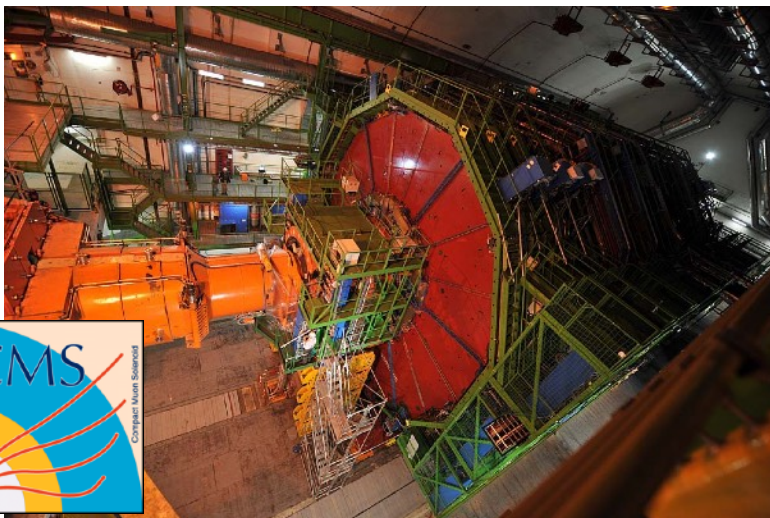
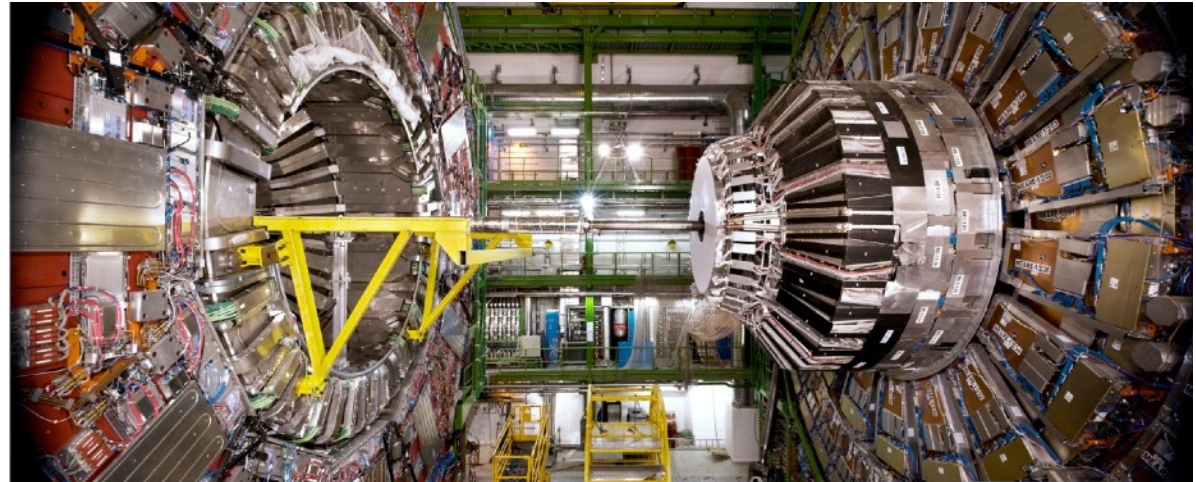
- Accurate measurement techniques to find out the properties and origin of jets

## ■ ...particle track reconstruction

- Use Machine learning to accurately reconstruct tracks of charged particles in the detector
- Develop better components to the detector

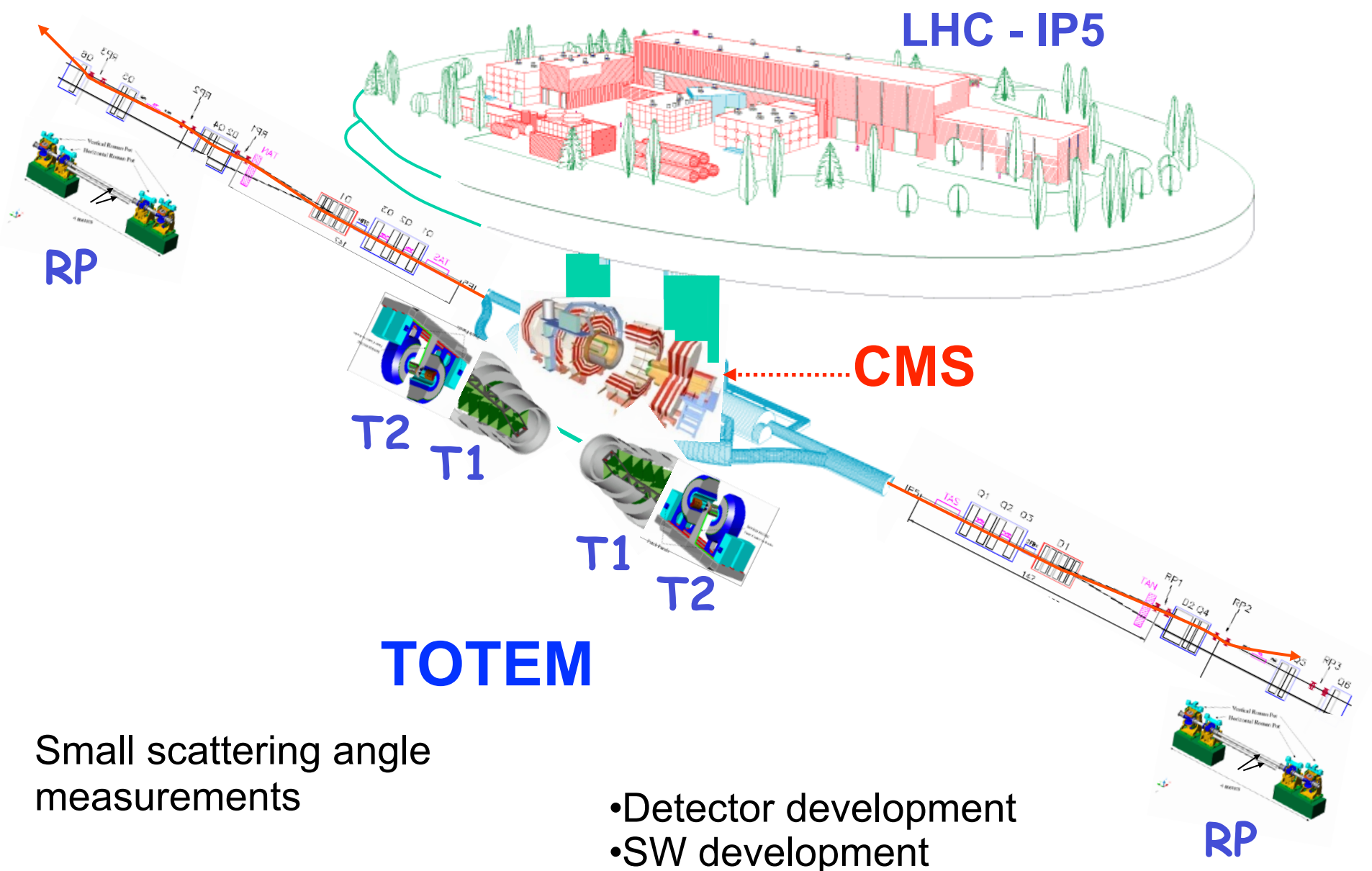






P. Eerola





Small scattering angle measurements

- Detector development
- SW development



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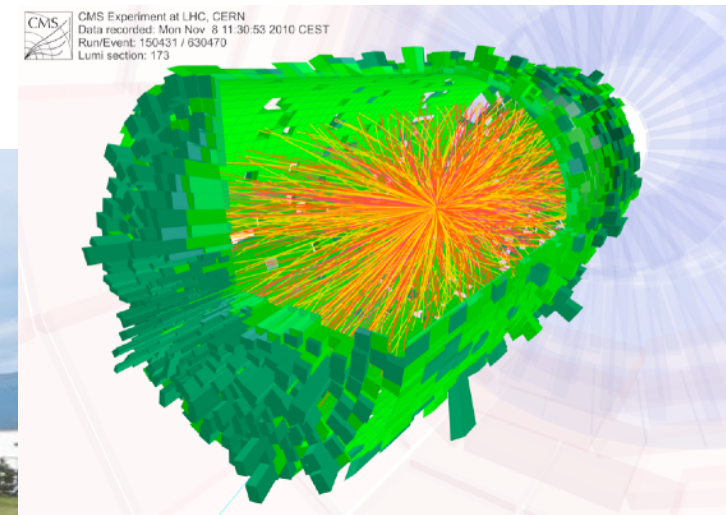
#TechnologyTransfer

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[www.hip.fi/summies](http://www.hip.fi/summies)



- High profile physicists giving lectures
- Excursions to CERN experiments
- Hundreds of students from around the globe
  - Summer student events
- Great way to start a career in particle physics!





- Trip to CERN and back is covered by HIP
- 1400 eur/month  
+ mobility allowance of 1050eur/kk
- Accommodation is not part of the position but Finnish office of CERN will help you out!

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(hip.fi→Graduate Education)  
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- ~3 years of studies by the summer
  - ▶ Studies in particle physics, is a plus not not necessary!
  - ▶ Programming skills are a plus!
- You can ask more information from the contact person, who is also the supervisor of the position!
- Deadline for the applications is **31.1.2019**
- Application: **free form application** ("motivation letter"), **study record** and a **resume**
- Decisions will be made in February, and the selected will be contacted with a letter





- **CERN BootCamp** is a one-week intensive course organised at CERN (5cr. at University of Helsinki)
  - Students will solve challenges related to society and commercialise ideas
  - Goals are related to commercialisation, innovation and service design
- **Schedule**
  - Kick Off 12. - 13.4 @ Laurea
  - BootCamp @ CERN 3.-7.6.
- Students from universities and universities of applied science from the Helsinki region
- More information at [www.hip.fi/summies](http://www.hip.fi/summies)



- 2-3 month internship at CERN
- Apply from CERN web page: [www.cern.ch/summies](http://www.cern.ch/summies)
  - Civil Engineering; Controls and Data Acquisition; Electricity; Electromechanics; Electronics; Health, Safety & Environment; Information Technologies; Materials Science & Surface Engineering; Mechanics; Physics
  - 3rd year students or older (not graduated)
  - Good language skills in English
- Deadline **31.1.2019**
- Note that you will need a **recommendation letter!**
- Selected will be contacted in mid April



# Thank you for your attention!



CMS Experiment at LHC, CERN  
Run/Event : 171178/11119024  
Lumi section : 12

**Muon,**  
 $p_T = 29.11 \text{ GeV/c}$

**Electron,**  $p_T = 22.76 \text{ GeV/c}$

**Muon,**  
 $p_T = 19.21 \text{ GeV/c}$

**Tau,**  $p_T = 33.85 \text{ GeV/c}$

$$M_{\mu\mu\tau_e\tau_h} = 189.9 \text{ GeV}/c^2$$