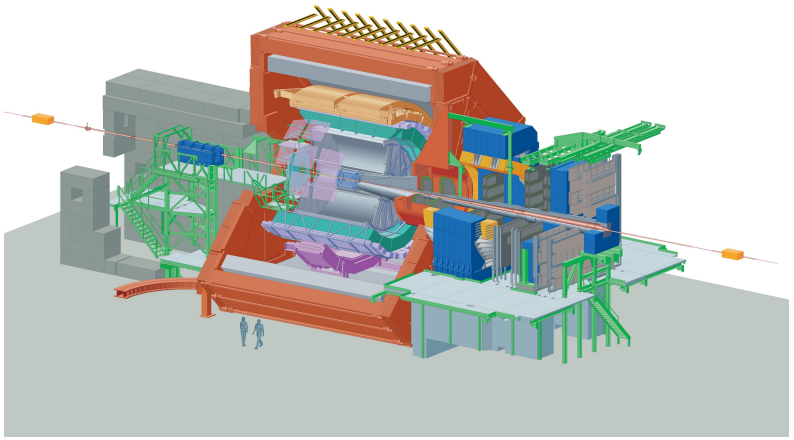
The Quark Gluon Plasma: ALICE

Raimond Snellings

for the ALICE group

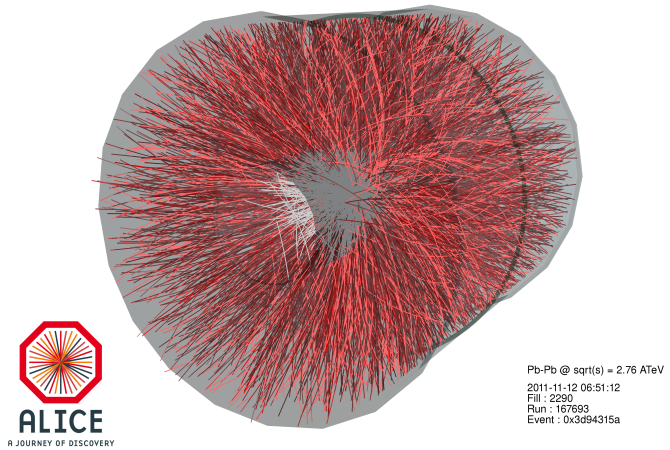


FOM Programme: 2014-2021

Group composition:

- *7 staff, 4 postdocs, 15 PhD students (paid by UU, FOM program, grants, CERN, China, collaboration Nantes)*

LHC FOM programme up to 2021 (2013)
NWO BIG Nikhef ALICE hardware (2014)
Two vici's, 1 vidi, ERC, projectruimte



The Nikhef ALICE Group

- Very strong position in ALICE
  - Management board
  - Sub detector project leader
  - Deputy physics coordinator
  - Physics working group convenors
  - Physics analysis group convenor
  - Editorial board members
  - Conference committee
  - Primary author many papers

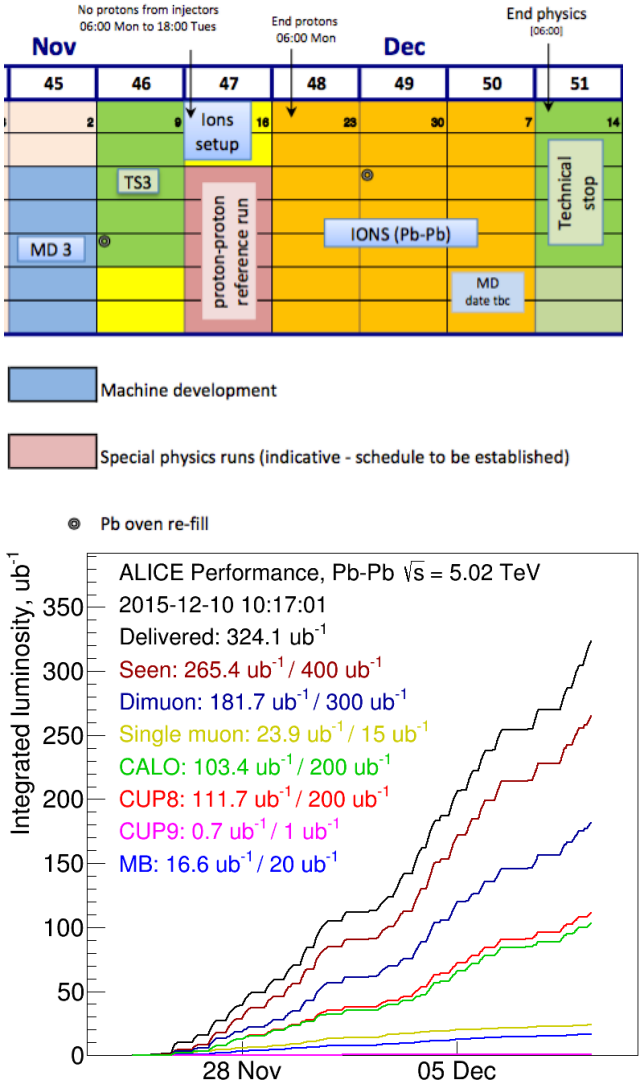
ALICE Run 1

- We study matter under unprecedented conditions (energy densities, magnetic fields)
- Extremely challenging to constrain the largely unknown properties of the QGP and the phase transition in heavy-ion collisions
- Requires many different observables
  - bulk observables (correlations e.g. collective flow)
  - heavy-quarks and jets
  - electromagnetic probes
- made a lot of progress in the last years

- After this short intro there will be two presentations of almost finalised PhD topics which address two of these very different observables
- Redmer Bertens: jet anisotropy in PbPb collisions
- Emilia Leogrande: minijets and multi parton interactions in pA collisions

ALICE Run 2

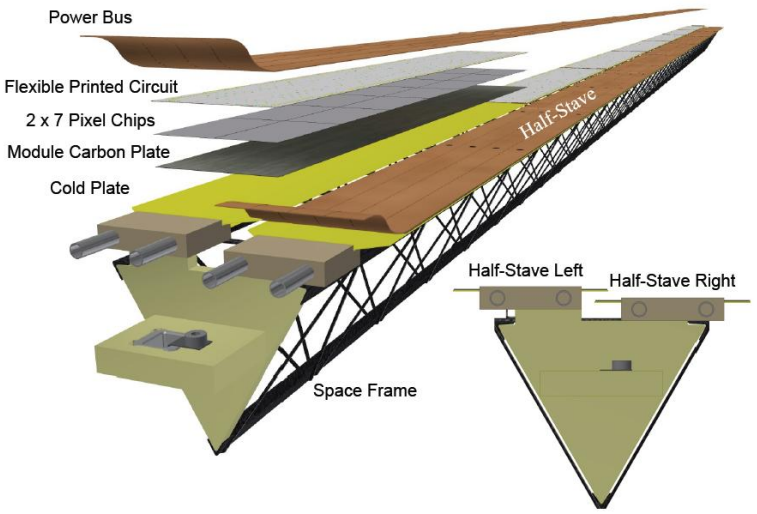
- Good ongoing run
- Already first papers in the collaboration based on golden runs
- Really looking forward to much more data (x10) and to the new measurements which will become possible
  - new heavy flavour observables accessible for the first time
  - multi-particle correlations
  - connections between pp, pA and AA

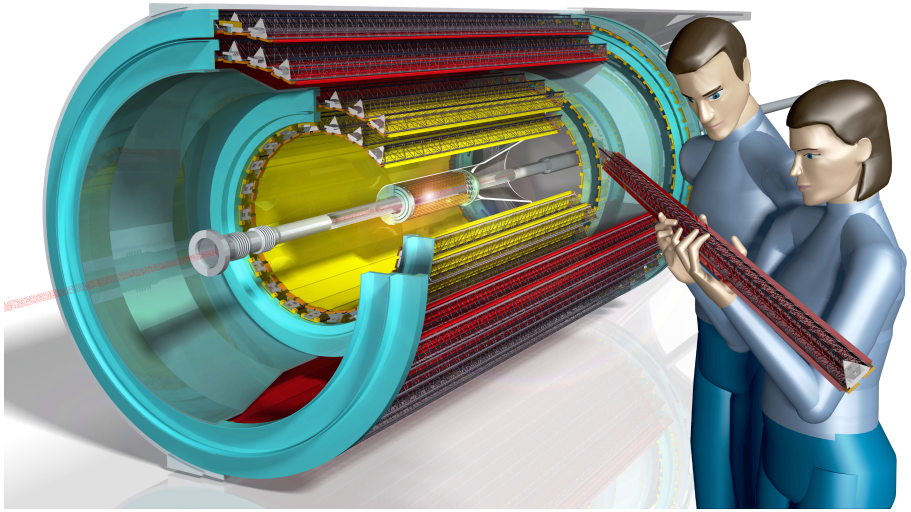


ALICE upgrades 2018/2019

The main upgrades of the central detector

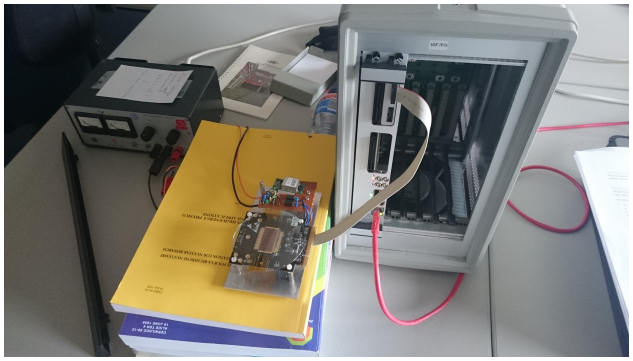
ITS upgrade



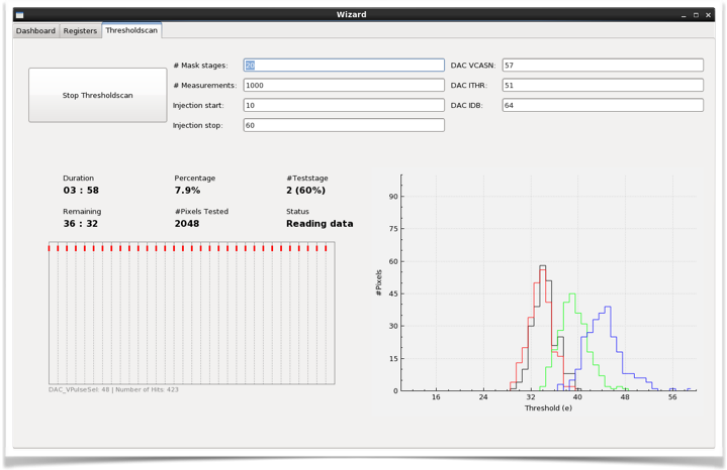


- focus on rare probes (many not possible to trigger on)
  - precision studies of charm and beauty baryons, mesons and quarkonia at low p_t
  - low mass di-leptons and direct photons
  - b-jets and di-jets with particle identification over a large kinematic range
- again factor 10 increase in events

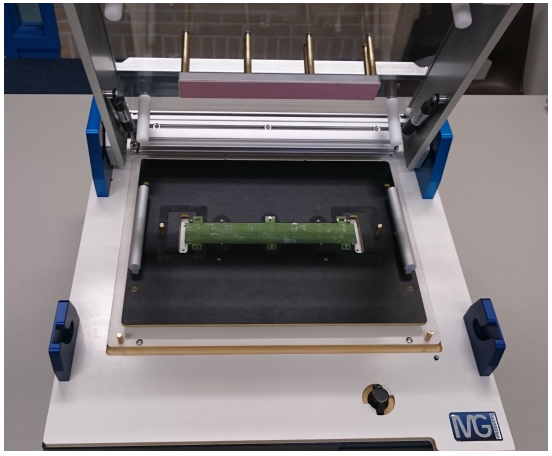
Pixel module test system



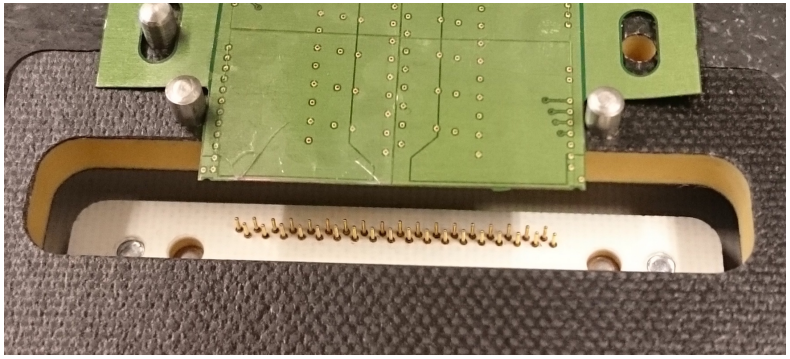
test system running
single ALPIDE2 for now until
real modules become available



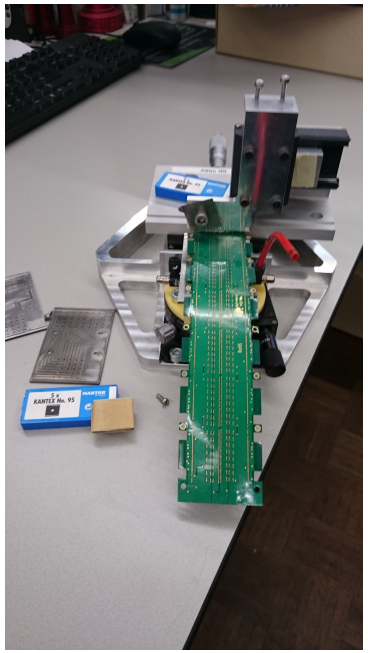
Industrial (Romex) PCB probing system. Custom adapted to finer pitch or contacts and flexible circuits



Produce 10 for collaboration



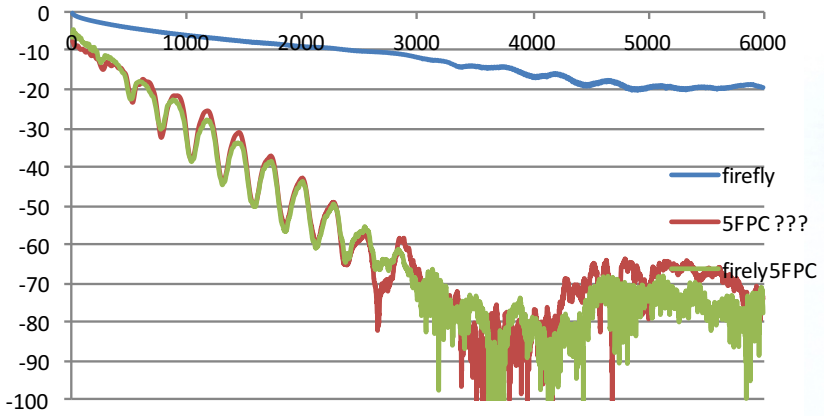
FPC trimmer



Other possibility under investigation for testing produced modules with cable and cut after tests

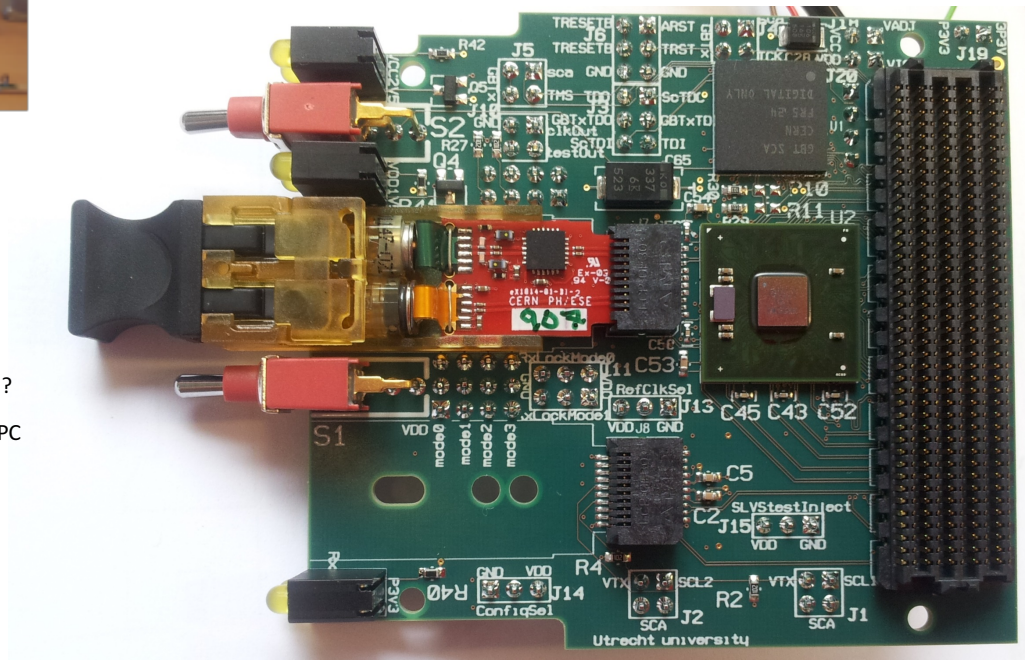
Read-out

Nikhef/UU has responsibility for testing data transport for across (firefly) cables and between modules



Nikhef has responsibility for integration of the read-out unit (between pixel modules and DAQ)

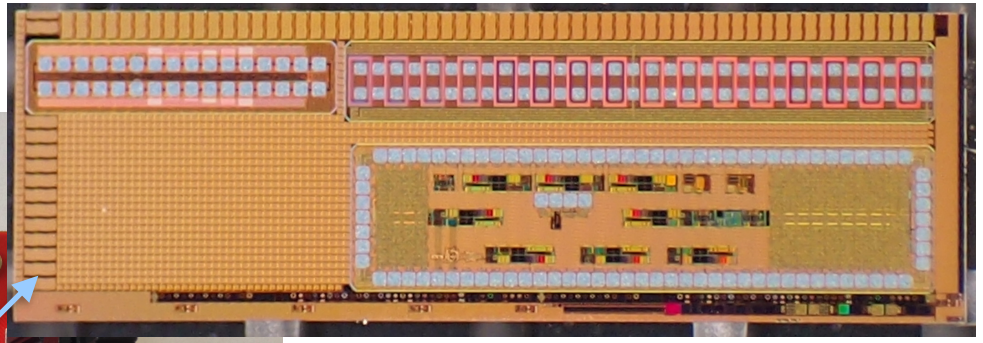
- Interface to local power supplies (Berkeley)
- Interface to pixel modules (CERN)
- GBT link to DAQ (Nikhef/UU)

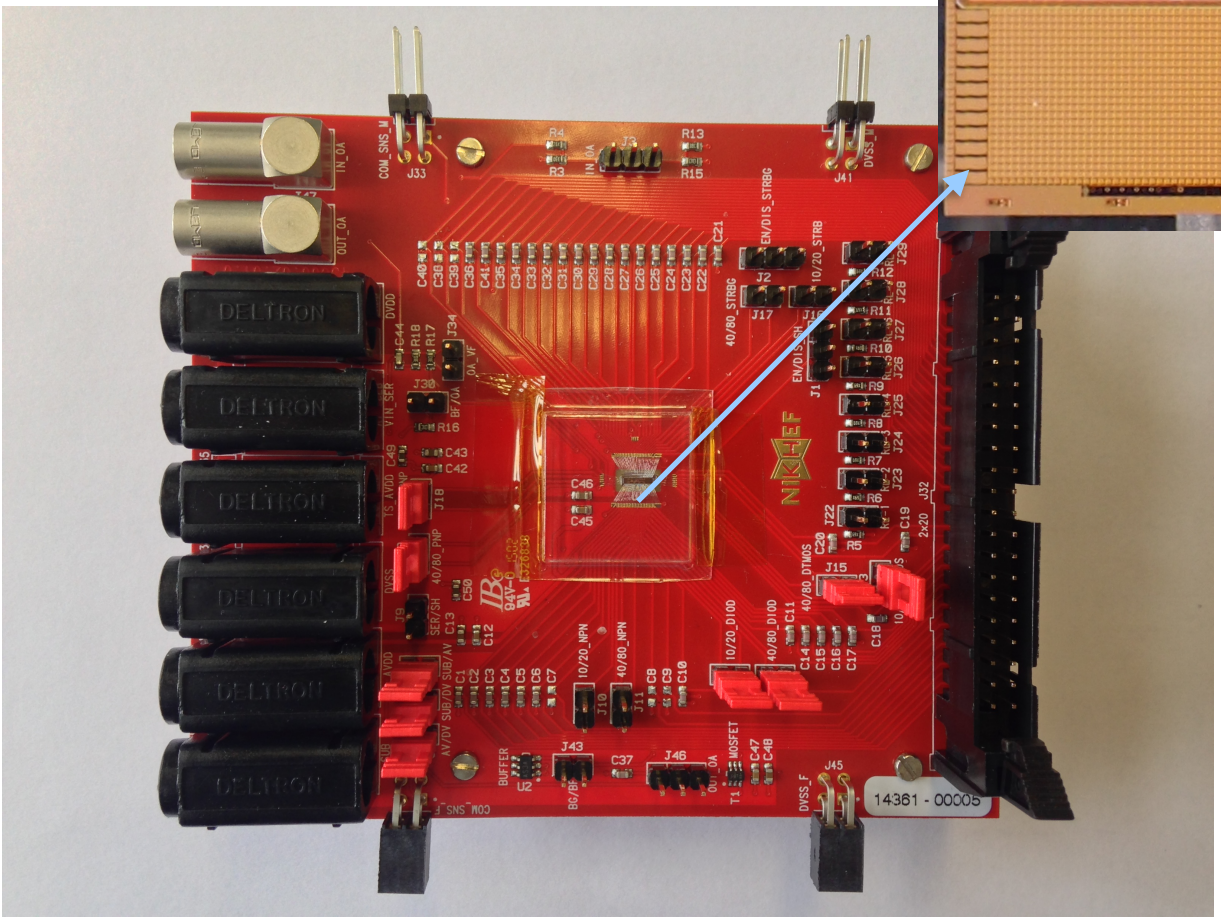


ASIC development

Produced and tested variants of band-gap and temperature sensor (Deepak)
Both selected for inclusion in ALPIDE

ALPOSE test chip





Serial versus parallel powering scheme investigated as well as options for including the power relation in the pixel chip (abandoned in favour of a more classical scheme)

Test board designed and tests done (German Hennao)

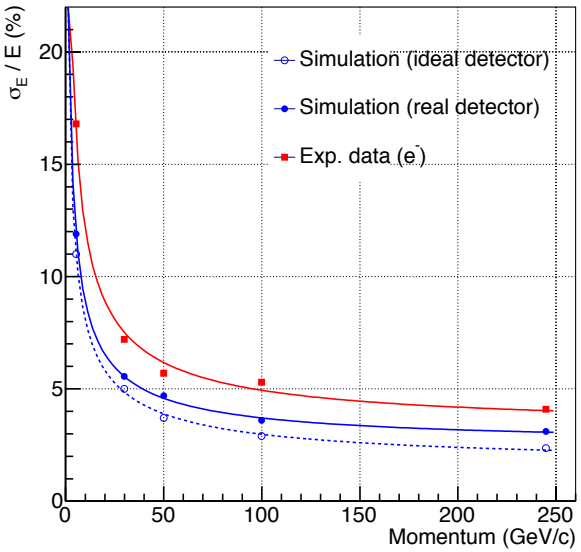
Stave assembly

for ITS stave assembly Mitutoyo installed in silicon alley

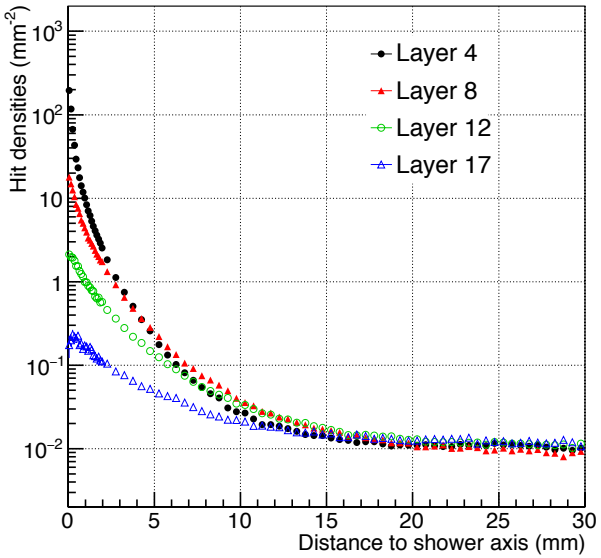
big project for the PhD students for a year, under supervision of technician

FoCAL

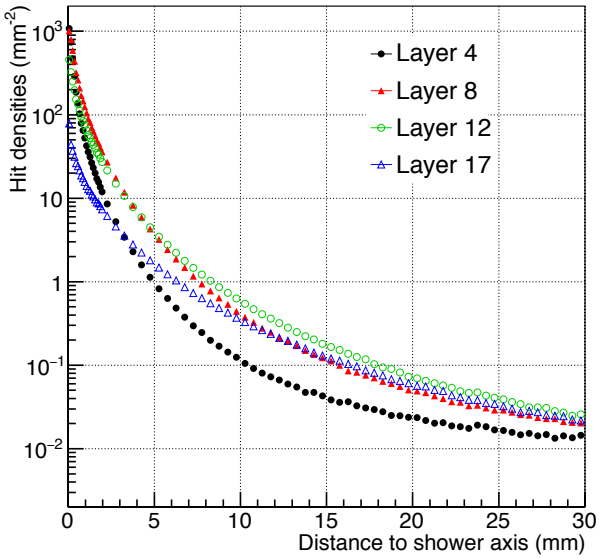
In addition we have currently a small R&D project for a new electromagnetic calorimeter in ALICE at forward rapidity. There is also interest in this project from the ILC (CALICE)



energy resolution



lateral profile 5.4 GeV



lateral profile 244 GeV

Excellent two shower separation

Thanks!