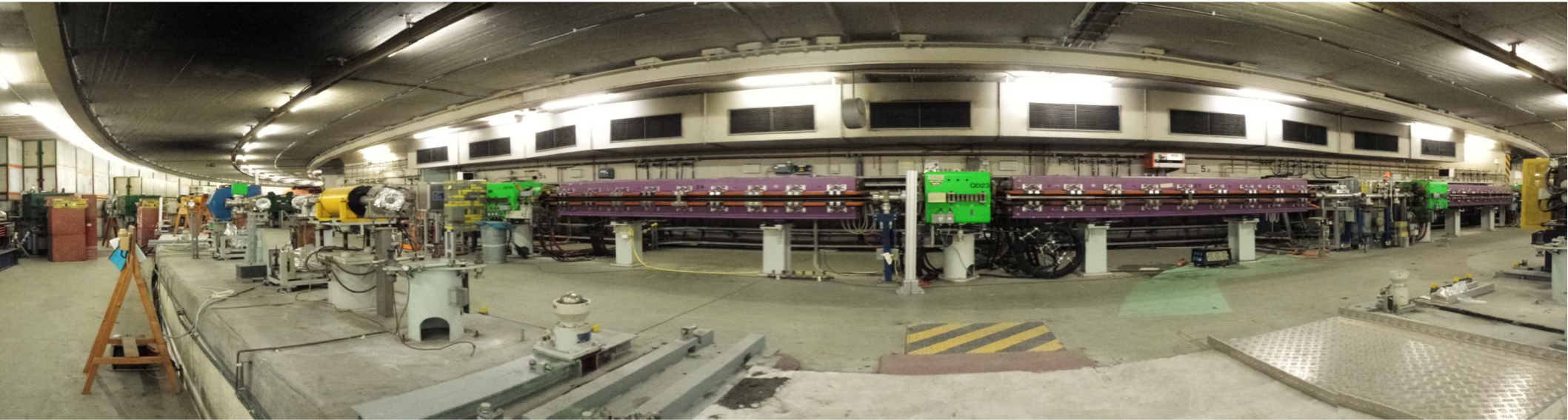


MAPS activities at DESY

WP7 Kickoff

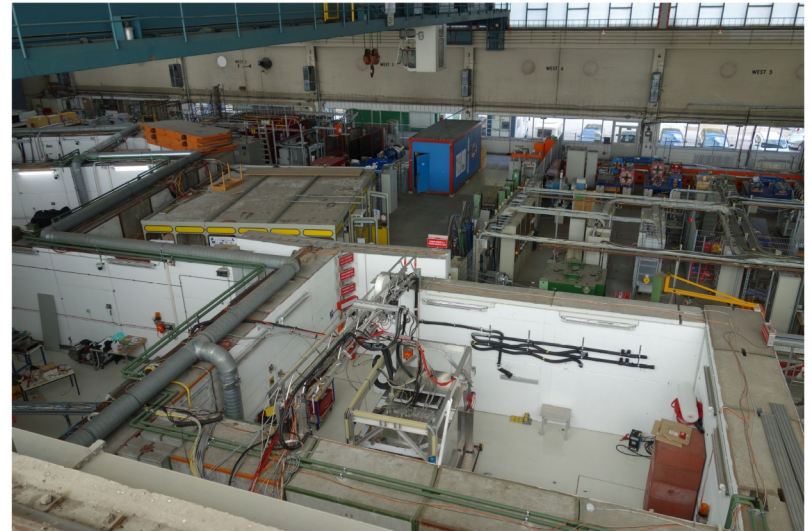
4/September/2019



Marcel Stanitzki (DESY)

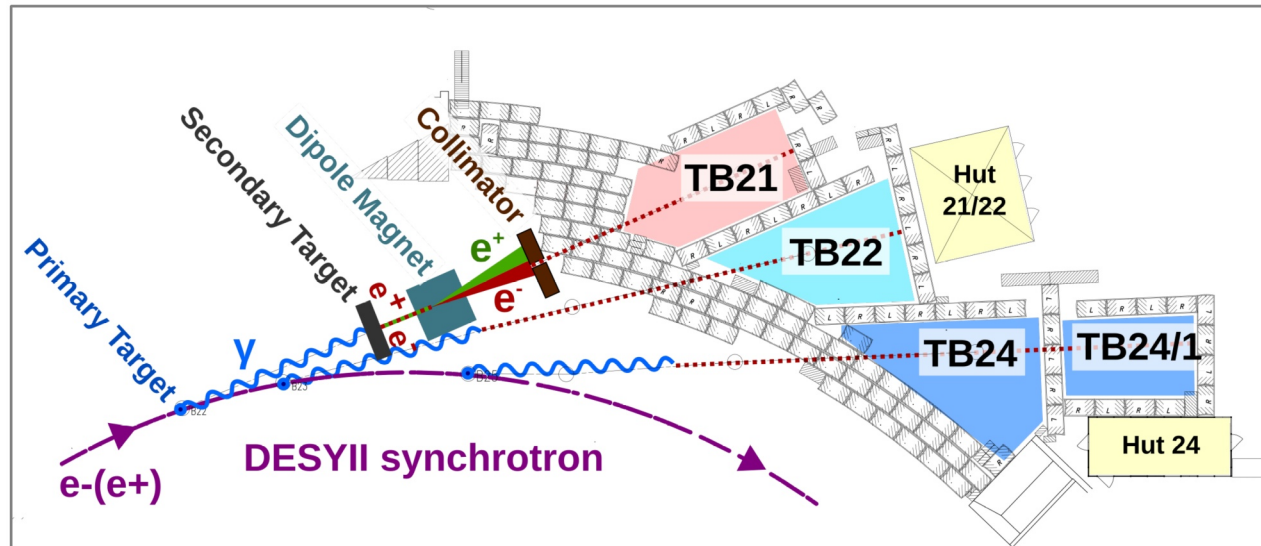
- DESY's role in WP7
 - During the development of the demonstrator beam telescope the DESY team will provide access to the DESY II Test Beam Facility and operate the existing EUDET-style telescopes for the characterization of the new detector and integrate the CREMAPS DAQ into the EUDAQ2 framework, which is used by many test beam setups worldwide and allows easy integration of many different devices.
- Staff involved
 - M. Stanitzki, I. Gregor
 - Telescope Team (Staff, Postdocs and PhD Students)

- Located at DESY Hall 2
 - In operation since early 90s
- One of two user facilities offering multi-GeV test beams in Europe
 - The other one being the CERN PS & SPS
 - Worldwide : Fermilab & SLAC
- Test beam coordination
 - Ralf Diener FH-FLC, Norbert Meyners MEA, Marcel Stanitzki FH-ATLAS



- Call for Beam time
 - Twice a year (Sep/Nov) for the coming year
- Schedule proposed by test beam coordinators
 - Basic unit 1 slot – 1 week

- Beam generation carbon fiber targets in the electron beam generate bremsstrahlung photons
 - Conversion at thin metal plate target to e^+/e^-
 - Momentum selection by dipole + collimator
 - Three individual beam lines
 - Single electrons, rates depend on: beam line, energy, target, collimation
 - Trying to be flexible to meet the needs of many users
- Already meets many requirements
 - Energy 1-6 GeV (1-100 GeV)
 - Rate ~ 10 kHz (100 kHz)
 - Spread $< 5\%$ (a few %)
 - $1 e^- / \text{bunch}/\text{mm}^2$ (few/bunch/ mm^2)
 - Independently operated
- Very reliable operation
 - Beam always available



Test Beam Usage from 2013 until Today



• Usage

- 300 – 700 users a year
- CERN shutdown → significant increase
- Typically 100-120 slots a year
- **Overall record 2019: 702 users**

• Main user groups

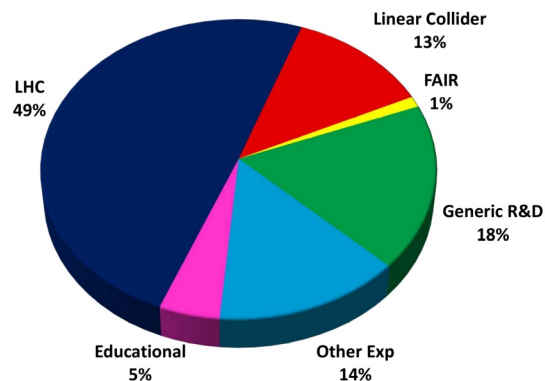
- Particle physics & Nuclear physics
- LHC → driven by the HL-LHC upgrades
- Linear collider and other experiments 28 %
- Generic R&D (incl. accelerator R&D) 18 %
- Education 5 %

• User community

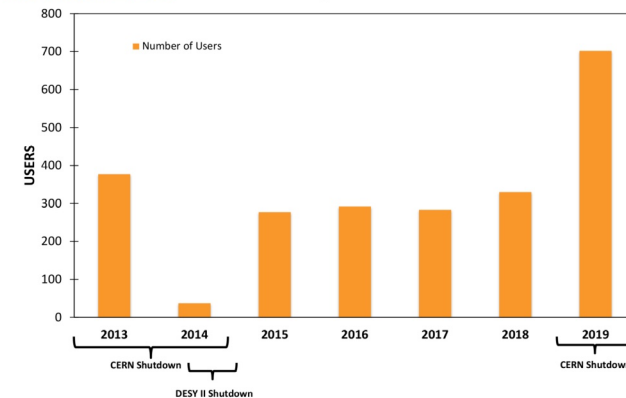
- Institutions from 42 countries worldwide
- ~ ½ are (PhD) students
- 40 % first time at DESY



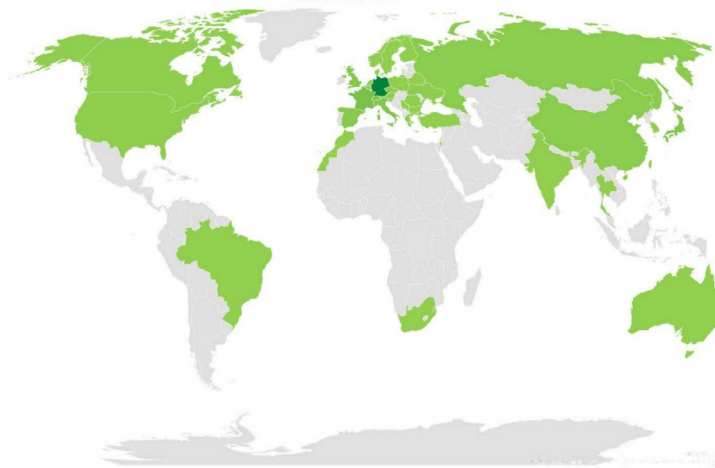
DESY II Test Beam Facility
User Communities 2015-2019



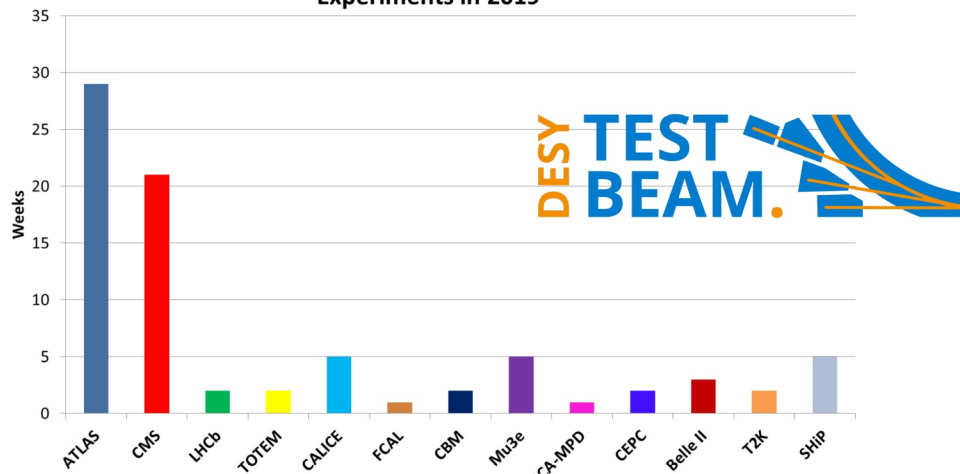
DESY II Test Beam Facility
Usage 2013-2019



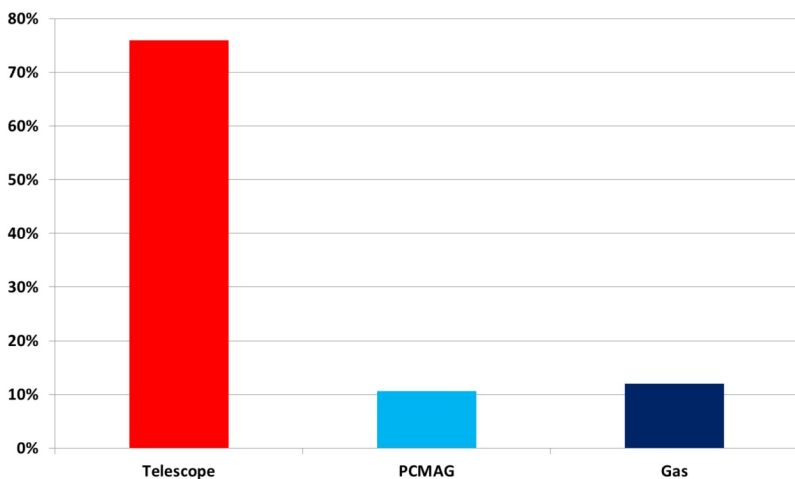
DESY II Test Beam Facility
Users 2013-2019



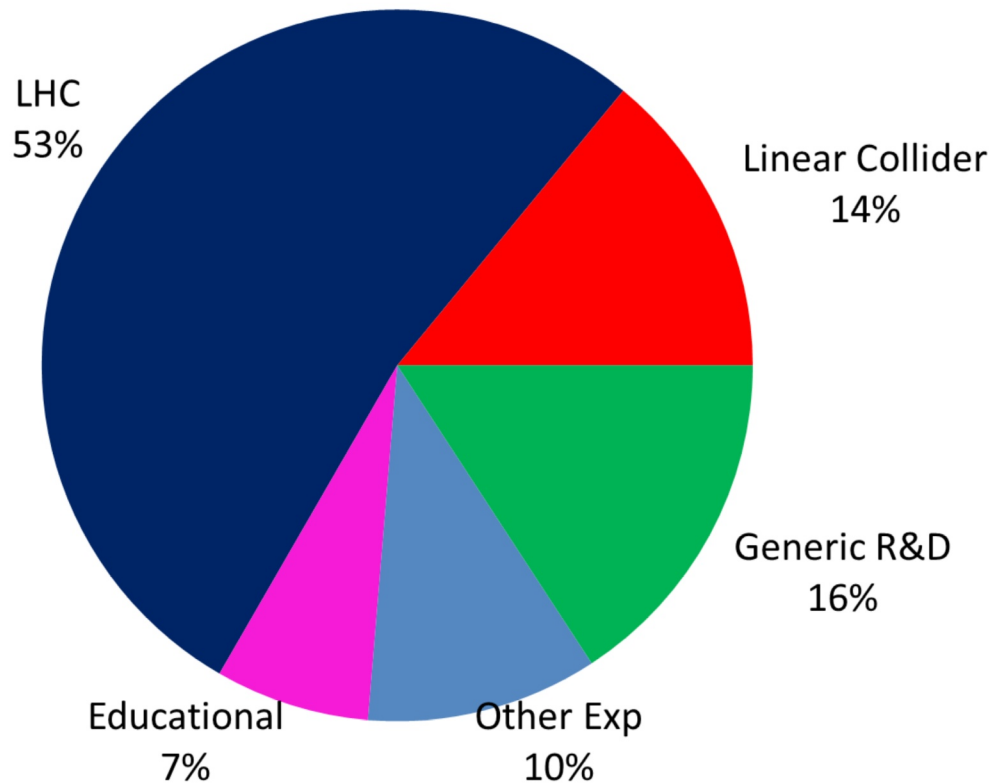
Experiments in 2019

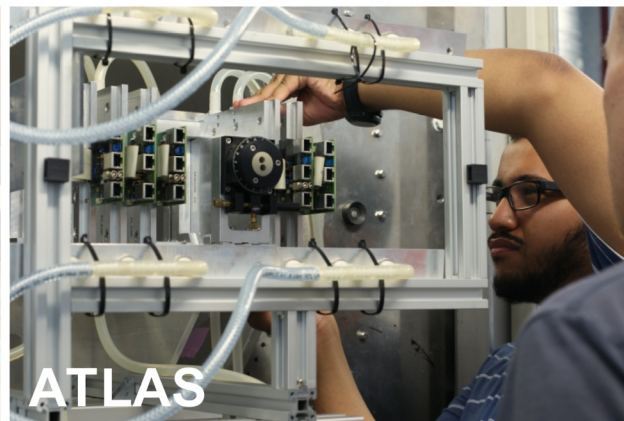
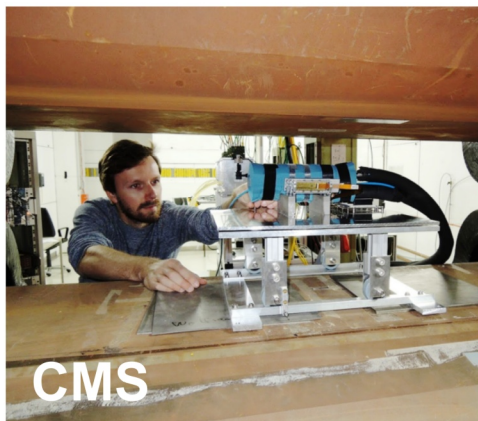
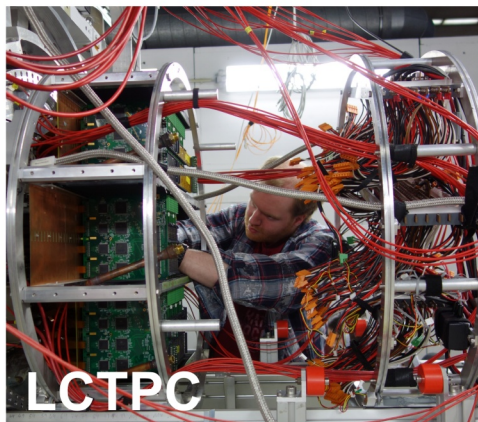
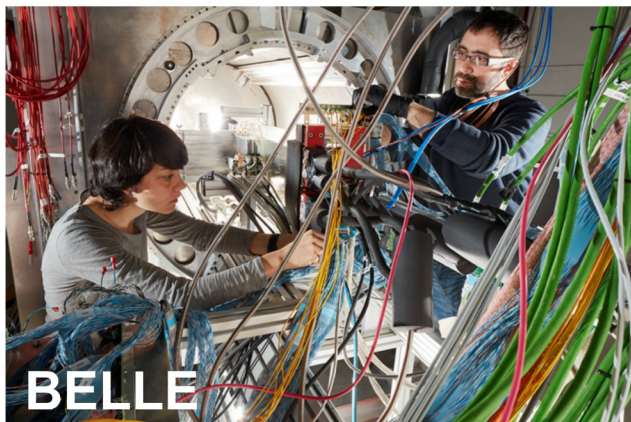


Infrastructure requests 2019

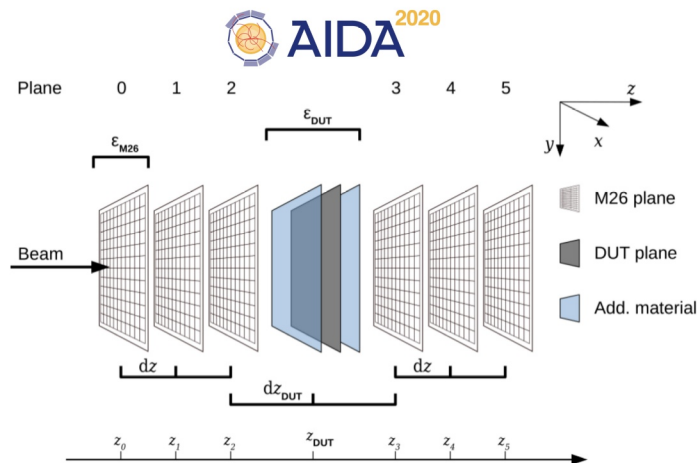
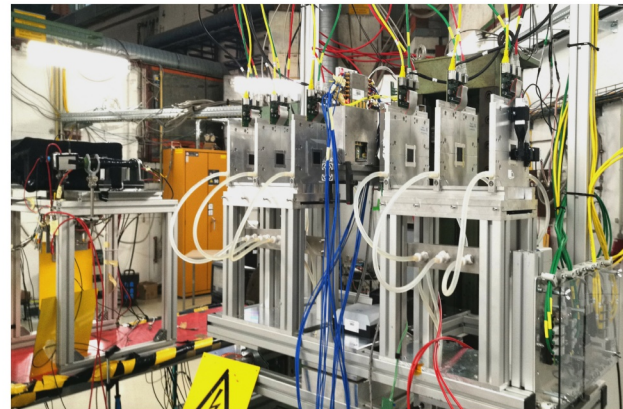
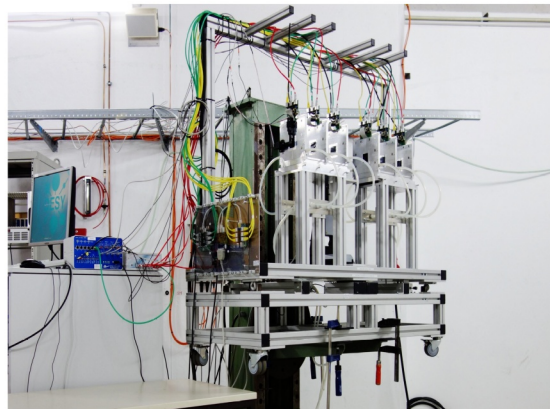


Telescope Usage 2019



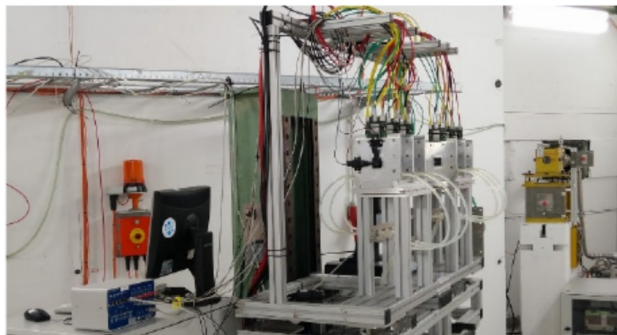


- Complete package:
 - Hardware, trigger, software,
 - Dedicated support crew
- The telescope in numbers
 - Six Mimosa26 pixel planes: 2 x 1 cm², 18.4 μm pitch
 - Trigger rates up to 3 kHz
 - Few micron tracking resolution
- Seven copies around the world
 - AIDA, ACONITE at CERN
 - DATURA and DURANTA at DESY
 - ANEMONE in Bonn
 - CALADIUM at SLAC
 - During LS2 AZALEA is based at DESY



EUDET-type hardware

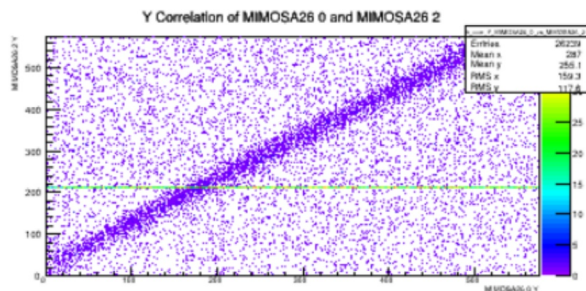
- 6x Mimosa sensors & DAQ
- Mechanics
- Trigger System



EUDAQ

Top-Level DAQ software

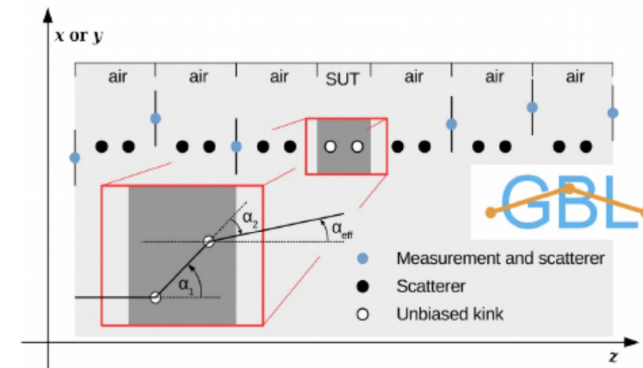
- Central run control & monitoring
- Synchronisation & acquisition



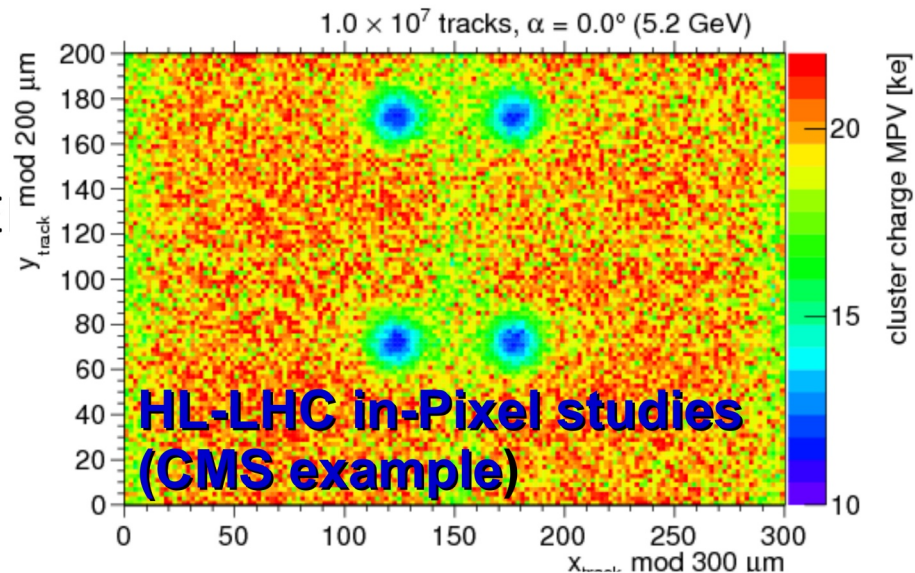
EUTelescope

Track reconstruction framework

- Masking, Clustering, Alignment, ...
- Track finding, fitting & results



- Telescopes
 - Moving towards Multi-sensor approach
 - Running Mimosa26, Timepix3, Alpide and FE in parallel
- EUDAQ2 replaces EUDAQ
 - Our common DAQ software to glue systems together
 - Used by ATLAS, CMS, ALICE, Belle-II, CALICE
 - See e.g.
 - <https://doi.org/10.1088/1748-0221/15/01/P01038>
 - <https://doi.org/10.1088/1748-0221/14/10/P10033>
 - EUTelescope & Corryvreckan as reconstruction packages



We're ready to characterize CREMAPS in the beam, once it is ready !