HIGH-D

SPONSORED BY THE

Federal Ministry of Education and Research

R&D for highly segmented multidimensional detectors for future experiments

Erika Garutti & Heiko Lacker

The High-D collaboration

RWTH Aachen, HU Berlin, TU Darmstadt, U Freiburg, U Giessen, U Göttingen, U Frankfurt a. M., U Hamburg, DESY, U Heidelberg, JGU Mainz, MPI für Physik München, TU München, U Bonn, FZ Jülich, GSI

Closing Remarks

Goal of this meeting

1) At the end of this meeting it should be clear to us:

- What are High-D **highlights** from 07-2021 to 06-2022
- What are the **challenges** for 2022 (and beyond)

➔ BMBF reporting 2022:
we are asked to compile a consortium-wide report with 2021-22 achievements.

2) We should have a concrete plan on how to build/support a **network** for detector developers in Germany

Confluence Page

https://confluence.desy.de/display/HIGHD/High-D+Home

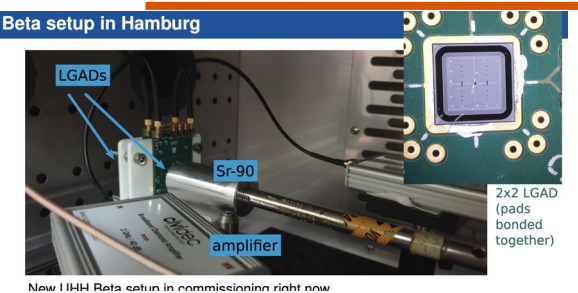
our place to communicate the success of the consortium to the outside world

Every institute should have at least one person with confluence edit rights
in order to document talks, theses, achievements/highlights, publications, ...

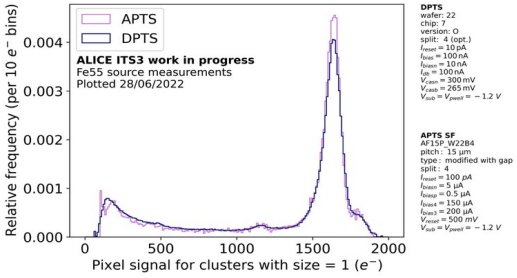
1) If you have already a DESY computing account:
   Please contact your DESY group administrators (with Erika and me in Cc)
   to add high-d confluence resource to your account

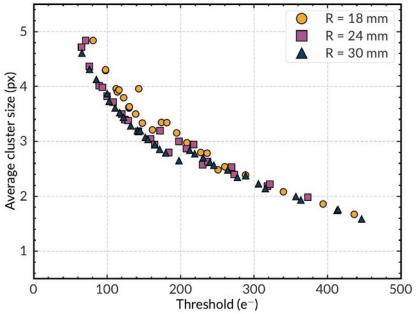
2) If you have not yet a DESY computing account:
   Please send an email to me and Erika. We will initiate a corresponding ticket

Achievements reported at this meeting

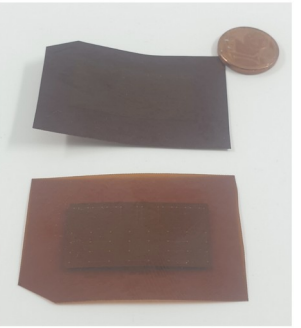


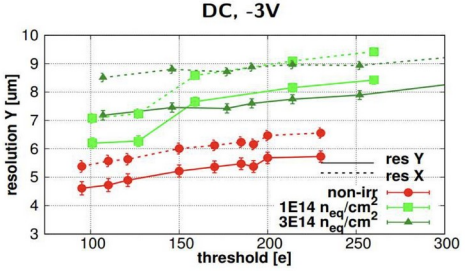
New UHH Beta setup in commissioning right now

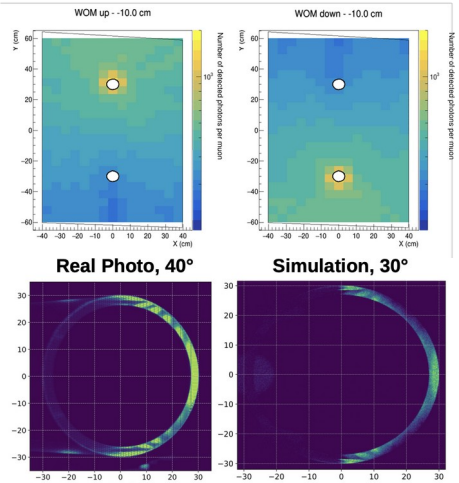


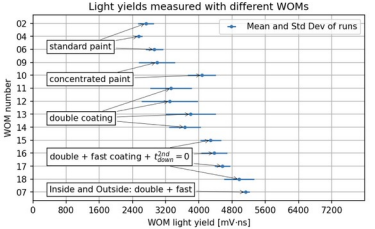


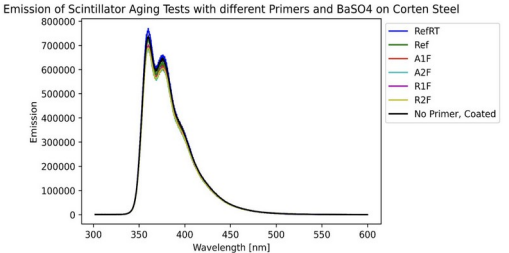
- MAPS (Monolithic Active Pixel Sensors) embeded in Polyimide
- Paper is on arxiv: https://arxiv.org/pdf/2205.12669.pdf
- Submitted to Nucl. Instrum. Methods Phys. Res. A

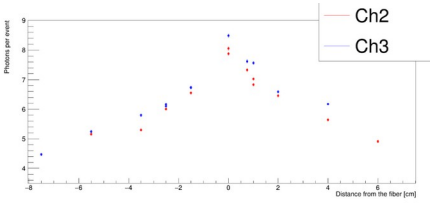


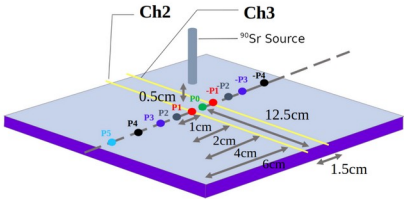




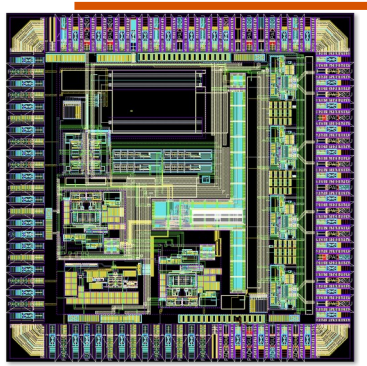


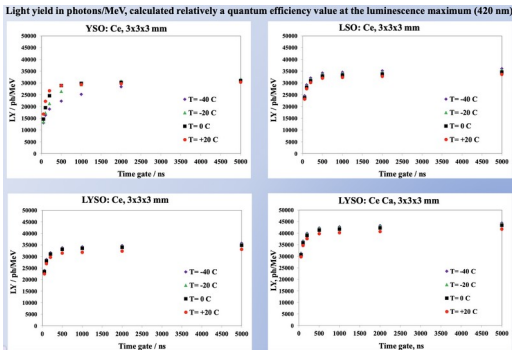


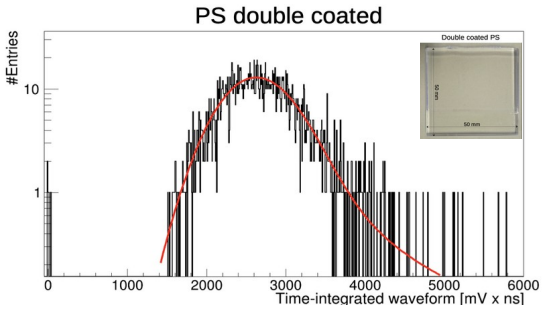


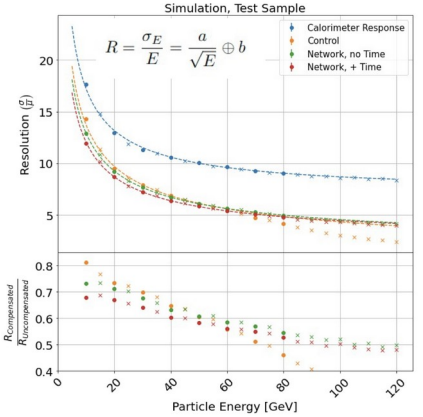


Achievements reported at this meeting

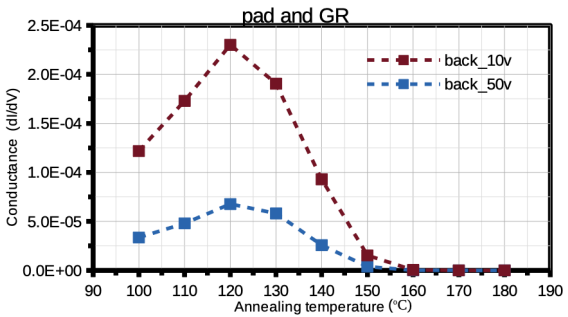


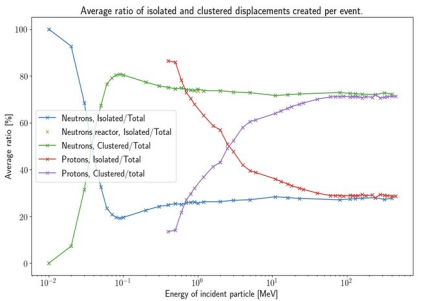


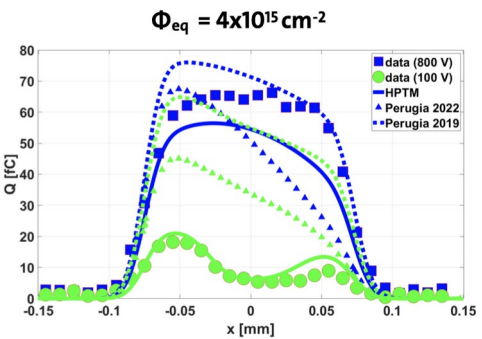


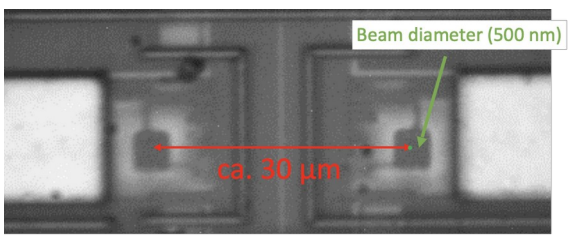


	a [%]	b [%]	χ^2/NDF
Calorimeter Response	49.516 ± 0.401	7.147 ± 0.067	4.575
Control	43.387 ± 0.119	0.010 ± 2.873	14.333
Network, No Time	40.236 ± 0.217	2.158 ± 0.087	0.857
Network, + Time	37.275 ± 0.208	2.448 ± 0.070	1.440

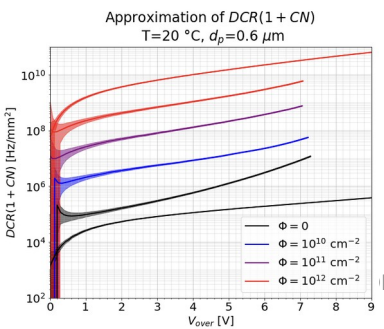








Micro-Beam: Microscope view of the pixel area



Many thanks for your contributions to High-D and this meeting!

Scientific results: highlights!

Milestones in the consortium proposal reached, e.g. documented by publications, etc., are particular successes that should be visibly documented on the confluence page!!!

Documentation started (many thanks for your contributions!), but still a lot to be added!

4D Tracking

Erika Garutti posted on 11. Feb. 2022 09:48h - last edited by Erika Garutti on 25. Aug. 2022 14:15h

- CMOS Pixelated Sensors
- Fast Timing layer

List of Highlights:

- 2022: MAPS response to deuteron beam at COSY
- ...

5D Calorimetry

Erika Garutti posted on 11. Feb. 2022 09:49h - last edited by Heiko Lacker on 02. Sep. 2022 10:54h

- CheapCal
- WOM

List of Highlights:

- CheapCal: Darkbox for prototype studies built and first prototype measurements performed
- WOM-based LS detector: 1-cell prototype detector close to completion for DESY tesbeam measurement in October 2022

Cross-disciplinary activities

Erika Garutti posted on 11. Feb. 2022 09:49h - last edited by Erika Garutti on 25. Aug. 2022 15:56h

- Novel plastic scintillator
- SiPM tools

List of Highlights:

- 2021: A Monte Carlo program to simulate SiPMs response to low light intensity is published (code available to consortium members on demand, see SiPM tools)
- 2022: A Python program to model the response of a SiPM to low light intensity is available to consortium members on demand (see SiPM tools)

Radiation effects

Erika Garutti posted on 11. Feb. 2022 09:49h - last edited by Erika Garutti on 23. Aug. 2022 13:55h

- LGAD
- SiPM

List of Highlights:

- ...
- ...

Scientific results: highlights!

Milestones in the consortium proposal reached, e.g. documented by publications, etc., are particular successes that should be visibly high-lighted on the confluence page!!!

Documentation started (many thanks for your contributions!), but for sure a lot to be added!

4D Tracking

Erika Garutti posted on 11. Feb. 2022 09:48h - last edited by Erika Garutti on 25. Aug. 2022 14:15h

- CMOS Pixelated Sensors
- Fast Timing layer

List of Highlights:

- 2022: MAPS response to deuteron beam at COSY
- ...

5D Calorimetry

Erika Garutti posted on 11. Feb. 2022 09:49h - last edited by Heiko Lacker on 02. Sep. 2022 10:54h

Fast Timing layer

Erika Garutti posted on 22. Feb. 2022 17:18h - last edited by Annika Simone Vauth on 24. Aug. 2022 16:30h

A cooperative project of DESY & Uni. Hamburg for the test beam instrumentation DESY TEST BEAM.

uilt and first prototype measurements performed
detector close to completion for DESY tesbeam measurement in October 2022

effects

on 11. Feb. 2022 09:49h - last edited by Erika Garutti on 23. Aug. 2022 13:55h

Cross-disciplinary activities

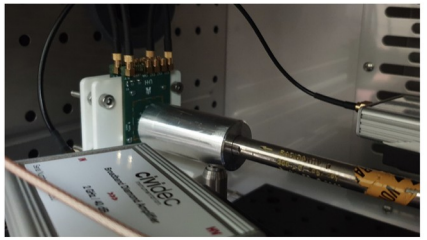
Erika Garutti posted on 11. Feb. 2022 09:49h - last edited by Erika Garutti (

- Novel plastic scintillator
- SiPM tools

List of Highlights:

- 2021: A Monte Carlo program to simulate SiPMs response
- 2022: A Python program to model the response of a SiPM

Beta setup for timing measurement in the lab:



ium members on demand, see SiPM tools)

demand (see SiPM tools)

Introduction to LGADs & Fast timing layer plans slides (Annika Vauth)

Networking: collaborations btw groups

- Collaborations as outlined in the High-D proposal should be described shortly

  on confluence page describing your projects:

  --> e.g. regular meetings, work share, exchange, common testbeams, publications, ...

- Also new collaborations seeded via consortium activities:

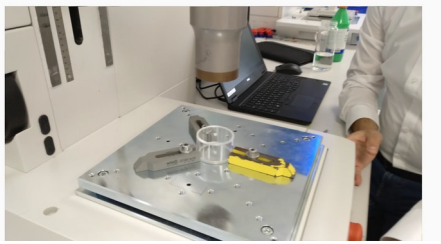
  --> ZEA-1 Jülich + Company (Hermann Ultraschall --> link to industry) <--> ALU:

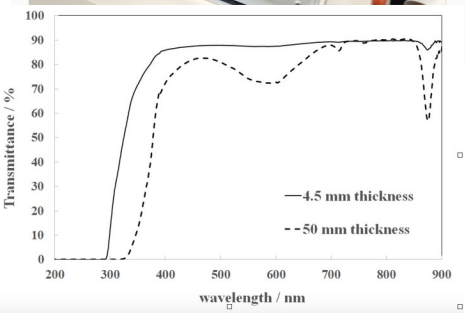
  Ultrasonic welding of PMMA vessels (AP 2.1)

  --> Berlin <--> Giessen:

  WLS-coated PS as cheap scintillator material (AP 3.4)

  --> ... Others ?





Networking btw young scientists HIGH-D

- Networking btw young scientists inside the work packages
  by regular working meetings, exchanges/visits (--> BMBF travel budget)
  Please report this as well on the confluence page.
- Ideas/wishes from the ECR session at this meeting (many thanks!):
  --> Start with email list (high-d-ecr)
  --> in-person meetings (at participating institutions) with lab tours
  (For any activities, you need support please ask Erika and me
  for help: e.g. funding for invited speakers/trainers)
  --> ...

Let’s keep up the momentum

and develop an interactive community with many new links
to establish this consortium beyond the current funding period!

Looking forward to see exciting progress at the 3rd consortium meeting
in around ½ year from now! Stay tuned for the exact date!