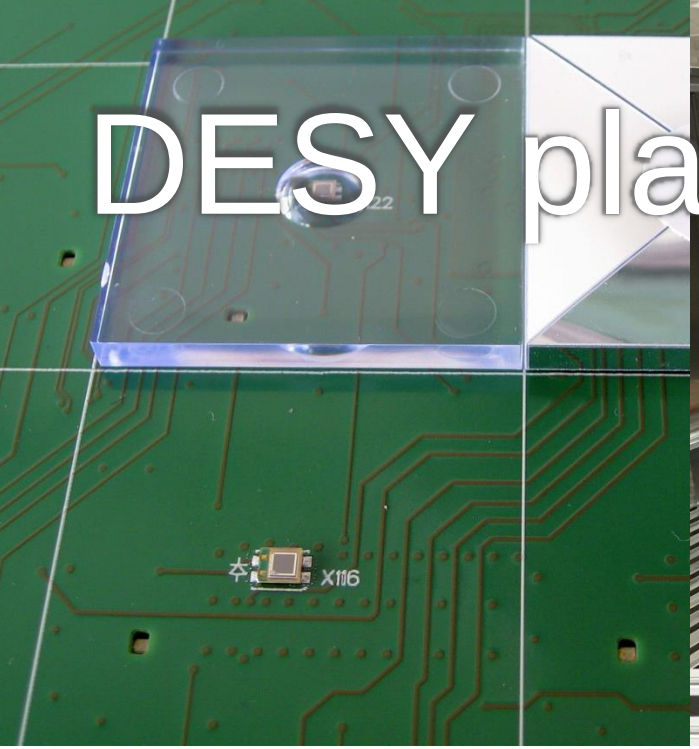
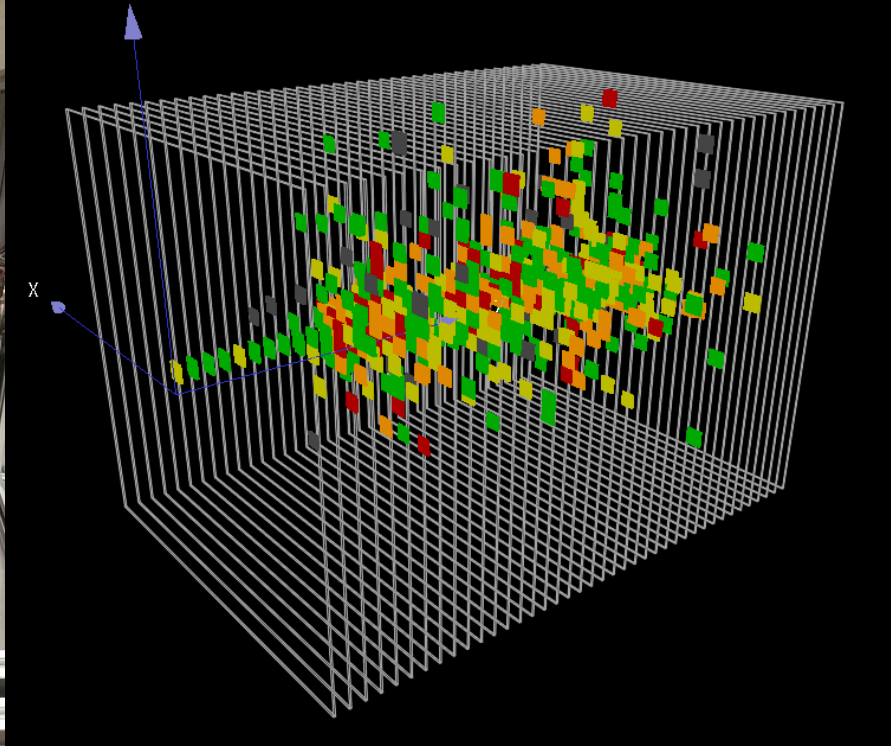
DESY plans





Katja Krüger

AHCAL Marzipan meeting, DESY
11 December 2024

HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

DESY.

AHCAL Status

Applications of SiPM-on-Tile technology

High channel count of highly granular calorimeters remains a challenge on all levels

- production, test, calibration, software, management
- each step in size requires higher degrees of automation

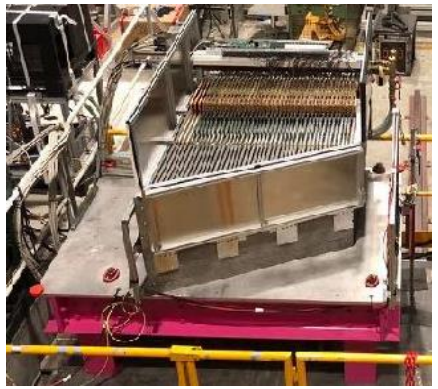
Large CALICE AHCAL technological prototype

- Demonstrated feasibility of SiPM-on-tile with integrated readout electronics
- optimised for ILC running conditions: power pulsing, no cooling inside active layers

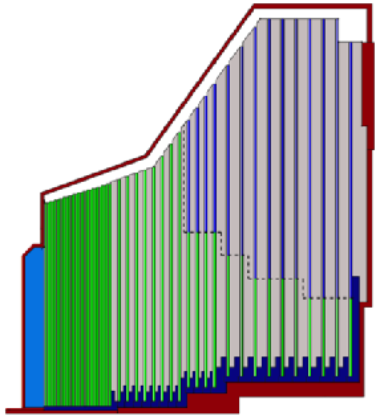
CMS HGCAL

- First use of SiPM-on-tile concept in a collider detector
- New challenges: radiation levels, data rates, operation at -30 degrees

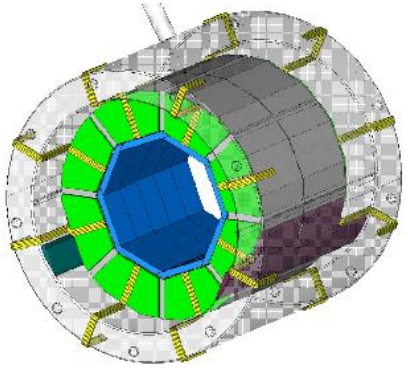
Want to profit from HGCAL experience for AHCAL



2018
CALICE AHCAL prototype
22’000 SiPMs

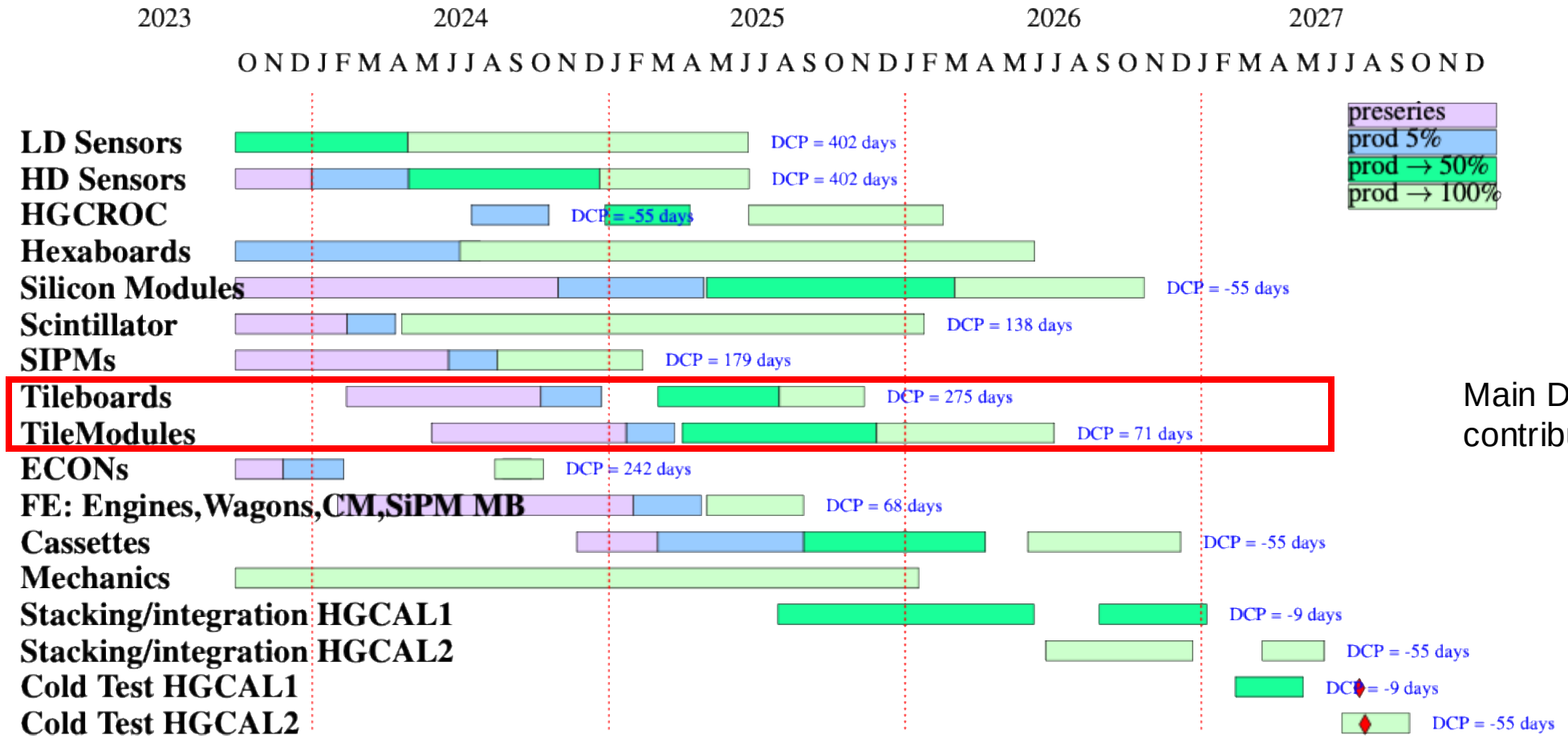


2028(?)
CMS HGCAL
(2 end-caps)
280'000 SiPMs



???
CLD / ILD HCAL
barrel only
4’000’000 SiPMs

HGCAL schematic schedule V30 October 2024



Main DESY contributions

Design of all Tileboard types largely finished (still some bug fixes & last-minute corrections)
Production of Tilemodules expected to finish ~ middle 2026
Some contributions to stacking/integrations at CERN expected

AHCAL Plans

- Build a small AHCAL prototype (“EM stack”) with continuous readout and with hit timing capability
  - starting with small reconfigurable prototype in first 3-year period.

- DESY contributions to AHCAL
  - Electronics: Front end boards
    - HBU for KLauS exists
      - But sequential readout scheme may not be applicable for continuous readout
    - Can likely profit from experience with HGCAL Tileboards
  - Mechanical and thermal integration
    - Small EM stack modification to allow thicker active layers ongoing
  - Common tasks for all: software, testbeams, analysis, …