Technical Board report

Lucia Masetti
JGU Mainz

CALICE Collaboration Meeting
April 20th, 2021

JOHANNES GUTENBERG UNIVERSITÄT MAINZ

Cluster of Excellence PRISMA+

News since September

- 3 Technical Board meetings, last one just before the beginning of this session
- Testbeam readiness review of SiW-ECAL in October at IJCLab
- Testbeams:
  - At DESY: end of 2021 and beginning of 2022 SiW-ECAL and AHCAL standalone and combined
  - Dual readout: testbeams at FNAL in December and February
  - At CERN: still preliminary plan for 3x2 weeks for SiW-ECAL + AHCAL; SDHCAL; (CEPC) SciECAL + AHCAL
    - Waiting for official approval by SPSC for the last two slots
- Daniel Jeans informed me about his intention to step down as software coordinator
  - Thanks Daniel for 8 years of very active commitment to CALICE!

SiW-ECAL readiness review

- Full day meeting at IJCLab
- Many thanks to Jiri Kvasnicka, MaryCruz Fouz and Wei Shen for their precious help as members of the panel!
- Report by the panel:
  - The panel finds the project in general in a very good state with the prototype running stably for weeks taking cosmics data proving the reliability of the system. Most of the concerns that were brought up during the review had already been considered by the team. They are aware of possible shortcomings and have clear plans for mitigation.
  - Recommendations for preparation, running, analysis of the data and further steps were given

SPSC review

- Our 3 requests for 2 weeks beam time each at the SPS this year were seen as "6 weeks for CALICE" and we were required to go through a review by the SPSC
  - First 2 weeks for SiW-ECAL and AHCAL already planned for, approval by SPSC needed for the remaining slots
- Document submitted on March 23rd
- Meeting with reviewers on April 7th and presentation by Roman at the SPSC meeting April 12th
- Preliminary positive feedback for all slots this year
  - Logistics of CEPC-AHCAL still to be clarified
  - For the next years, requests might be made together with a long-term plan to be presented to the SPSC

SPS schedule

SPS user schedule for 2022

schedule issue date: 07-Apr-2022 Version: 0.6 LHC Exp. PS/SPS Exp. Other Exp. INT Exp.

	Week	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		Mar			Apr				Mai				Jun					Jul					Aug					Sep				Oct				Nov					Dec
	Machine												TS1 RP															TS2 Coldex RP													
North Area	T2 - H2				SPS & TT20 Setup 7	NA Setup 14		NA61 SHINE 16			CMS HGCAL 7	NA61 SHINE 7	NUCLE-ON 7	EP FTS 7	Calice (SiW ECAL) 14		NA61 SHINE 35					STORM 7	KLEVER 7	CMS PIXELS 7	CMS OT 7	CMS HF 7	FASER pre shower 7		Place-holder 14		NA65 7	CMS HGCAL 7	LHCf 7	LHCb ECAL 14		ALICE FOCAL 7	SND 5	NA61 setup 150 AGeV/c 7		NA61 150 AGeV/c 14		NA61 13 AGeV/c 7	
	T2 - H4				SPS & TT20 Setup 7	NA Setup 14		GIF 16			RD51 7	GIF RD51 7	GIF 7		NA63 14	LHCb ECAL 7	CMS BRIL 7	ATLAS ZDC 7	GIF RD51 14		NA64e 70									Place-holder 14		GIF RD51 14		CMS ECAL 12		Medipix 7	HERD 7	PAN 5	PAN 7		
	H6 parallel				SPS & TT20 Setup 7	NA Setup 14		CMS PIXELS 9	ATLAS AFP 14		EP PIXEL ATLAS MALTA 7			CERF 7	ALICE ITS 14		ATLAS MALTA EP PIXEL 7			CMS PIXELS 14	EP PIXEL ATLAS MALTA 7		RD42 7	PICSEL 7		ALICE FOCAL 7		ATLAS AFP 14	MONO LITH EP-PIXEL MALTA 7	NA62 14		MALTA EP PIXEL MONO-LITH 5						
	H6 parallel						ATLAS BCM 10							RD42 7				EP hybrid 7	ATLAS ITK PIXEL 14						CMS OT 7		EP hybrid 7	ATLAS BCM 7		RD50 7	EP hybrid 7	CMS PIXELS 7							
	H6 ACONITE parallel						ATLAS ITK PIXEL 9	ATLAS HGTD 14			ATLAS ITK PIXEL 14			ATLAS ITK PIXEL 7				ATLAS ITK STRIP 7	ATLAS HGTD 14		ATLAS ITK PIXEL 14			ATLAS ITK PIXEL 14	ATLAS HGTD 14		CMS PIXELS 7	ATLAS ITK PIXEL 14		ATLAS HGTD 14	ATLAS ITK PIXEL 7							
	T4 - H8				SPS & TT20 Setup 7	NA Setup 14			LHCb 7	TOTEM 14		STI 7	CMS MTD 14		ATLAS Tilecal 14		IDEA CC 7	LHCb 7	LHCb (TOTEM) 7	TOTEM Q-fib 7	Medipix / Q-fib 7	ATLAS FCAL PULSE 7	IDEA DRC 7	TOTEM 7	ALICE PHOS 7	EIC dRICH 7		UA9 14		LHCb / SEL-DOM 14	Place-holder 14		ATLAS Tilecal 12		NUCLE-ON 7	NA60+ 7	NA60+ 4		

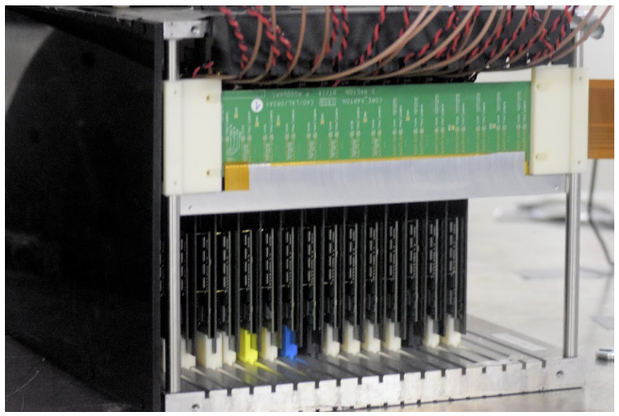
From Roman's talk at SPSC

IJCLab Irène Joliot-Curie Laboratoire de Physique des 2 Infinis

SiW-ECAL in beam test @ DESY

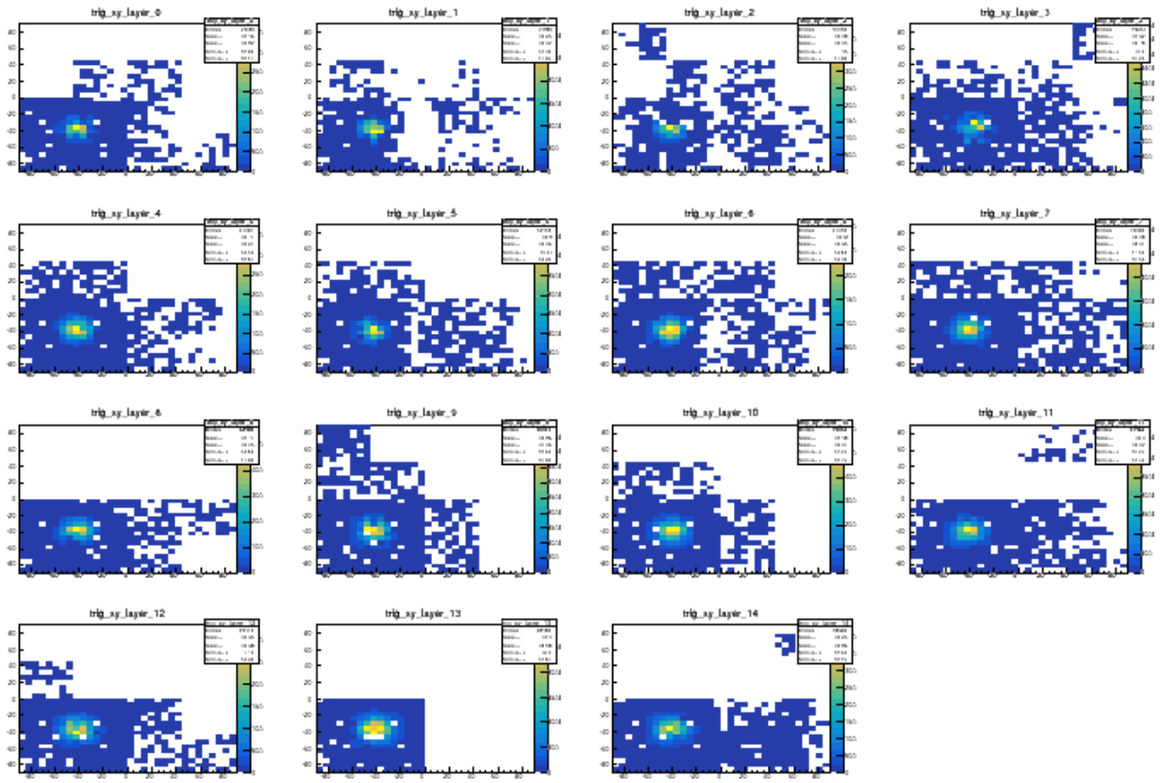
CALICE

Detector Setup



Detector in beam position

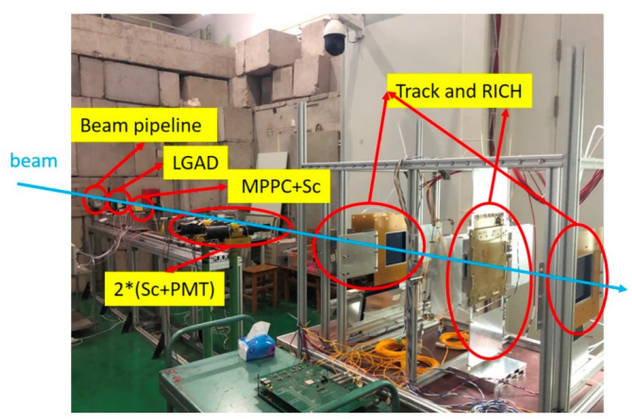
Hit maps of all 15 layers

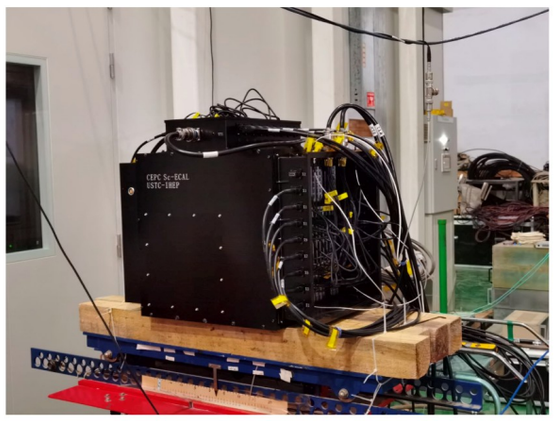


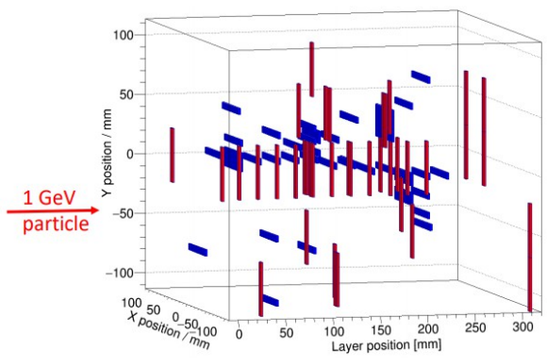
- Stack operational
- Analysis ongoing
- Gearing up for upcoming beam test at CERN

From Roman's talk at SPSC

- Successful beam test at BEPC-II Testbeam Facility at IHEP campus (2020)
  - E3 beam line: mixed particles with protons and pions (momentum: 300MeV-1.2GeV)
  - Mostly with low-energy hadrons; a very small fraction of electrons
  - Limited statistics due to the low beam rate (~1Hz)
- Conclusion: Sc-ECAL prototype demonstrated to be ready for beam tests
  - Tests with high energetic electrons and hadrons are mandatory for prototype validation



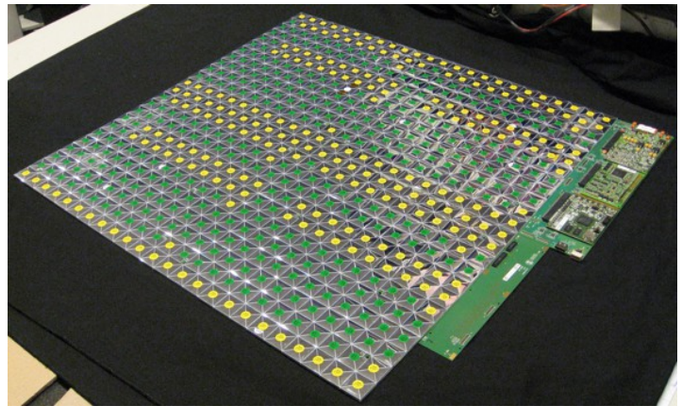




From Roman's talk at SPSC

AHCAL Technological Testbeam Prototype

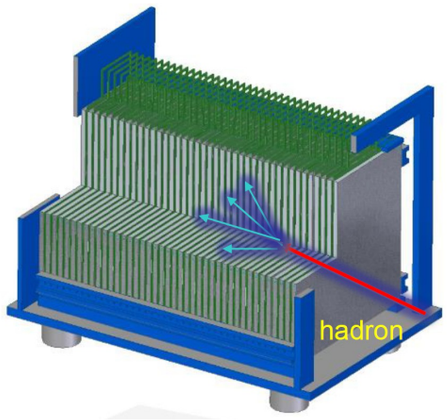
- Large enough to contain hadron showers
  - 38 active layers of 72*72 cm²
  - 4 HBUs per module
  - in total: 608 SPIROC2E ASICs, **~22000 channels**
  - SiPMs: Hamamatsu S13360-1325PE
  - Overall weight 6t
- All modules interchangeable
- Built with scalable production techniques in ~2 years
- Operated in beam tests with muons, electrons and pions at CERN SPS in 2018
  - 3 weeks of beam time
  - Collected O(100) mio events
  - Very stable running
  - **Nearly noise free**
  - **< 1 per mille dead channels**
- Main goal for upcoming beam test campaign is common running with electromagnetic calorimeters and testing of new technological developments

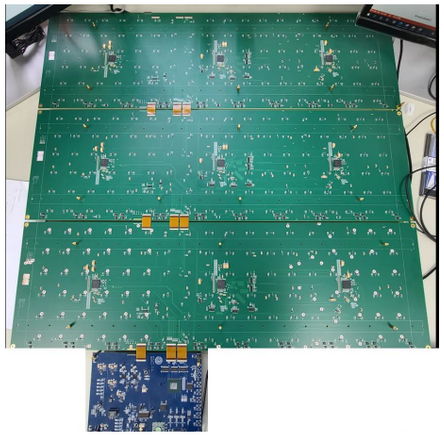


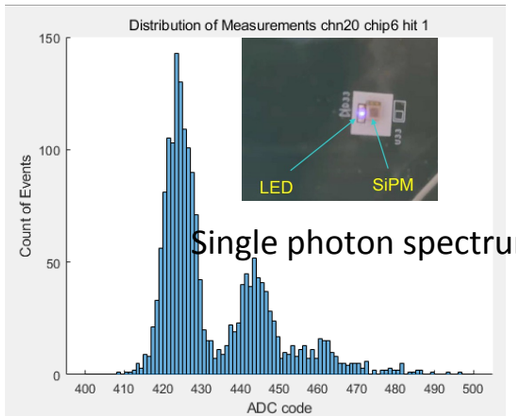
From Roman's talk at SPSC

AHCAL Prototype – New sensitive layers

- Optimised for operation at circular colliders
- Each sensitive layer with 3 HBUs: each (24×72 cm²) hosts 108 tiles (40×40×3 mm³)
- DAQ optimised to achieve a much higher event rate
- New SiPM option: NDL-SiPM with high PDE, high pixel density and large sensitive area







- New AHCAL sensitive layers: status and plans
  - Successful tests with cosmic muons with two layers
  - 4 full layers assembled recently, soon followed by 20 more layers (mid-April)
  - All new layers planned to be ready before June

From Roman's talk at SPSC

SDHCAL – Beam test goals

Main goals:

- Apply a new calibration scheme (based on equalizing the response by applying different threshold value/ASIC) in order to improve on the SDHCAL response homogeneity.

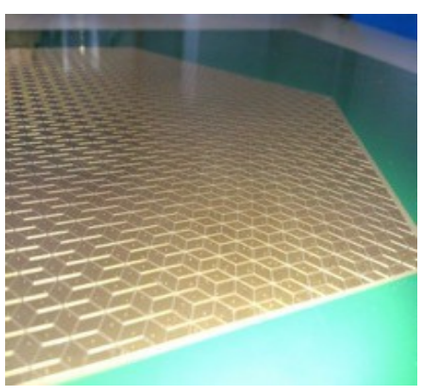
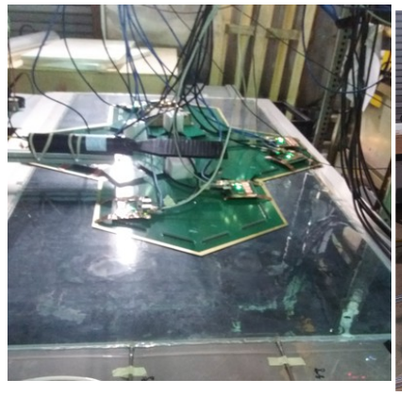
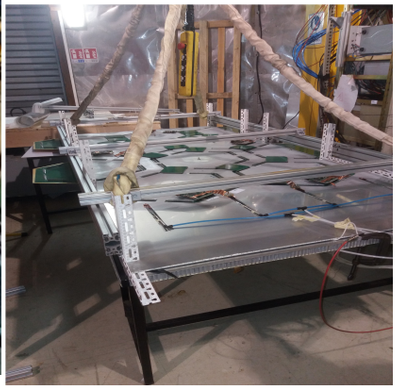
- Study the difference of hadronic showers produced by protons, pions and kaons in order to exploit their differences in developing new PID techniques.

Other goals:

- Test SDHCAL with SiW ECAL
- Test the woven strips scheme
- Test first timing-SDHCAL layers (AiDAInnova)
- Test µWell chambers as active layers by replacing a few GRPC

Beam requirements:

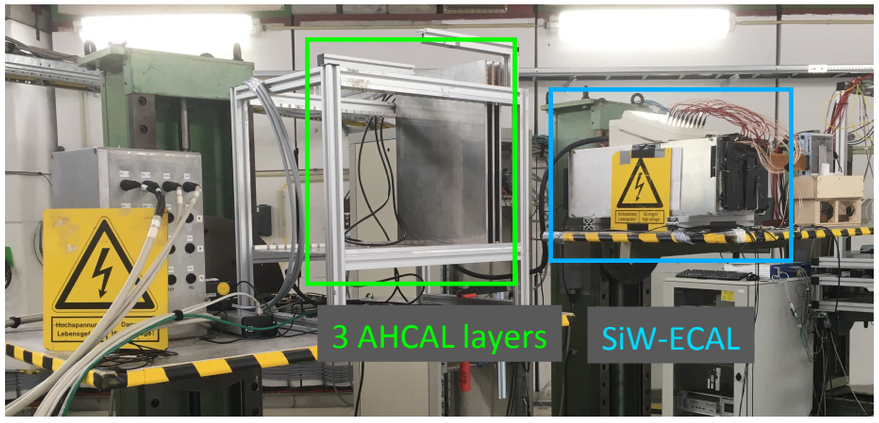
- Muons
- Pions, kaons, protons, from 10 to 90 GeV (pure hadrons)
- Low intensity beam (< 1000 particle/cm2/spill)

From Roman's talk at SPSC

Common beam tests

Preparation on common SiW-ECAL AHCAL beam test



SiW-ECAL + AHCAL DAQ test @ DESY in March 2022

- Common beam tests are a particular strength of CALICE
  - Particle reconstruction with realistic setup
  - Early integration of full calorimetric systems
- Successful synchronisation of data recorded with SIW-ECAL and AHCAL
- Common running makes full use of EUDAQ tools (developed within European projects)

Summary

- Looking for a new software coordinator
  - Suggestions for good candidates are welcome
- Many new testbeam data being collected and analysed
  - More upcoming testbeams, including at the CERN SPS
  - Our prototypes are mostly ready, logistics being clarified
- SPSC review in April
  - Preliminary feedback very positive, waiting for official confirmation