

SDHCAL activities dashboard

Gérald Grenier

IP2I (previously IPN) Lyon

June 24th, 2021

Ongoing activities

Test beam analysis

all TB

- Uniformity (Guillaume)
- Low Energy hadrons (Bing+SJTU) Paper in preparation
- Uses of BDT (Bing+SJTU) Published.

09/2018 only

- SiWECAL+SDHCAL (Hector+CIEMAT : (done ?))
- Tricot electronics (GG, Imad (?) on hold (?))

2015 only

- Analysis with rotated device (Hector)

Ongoing activities

Hardware

- 2m² GRPC+HR3 ASU+ new DIF (Lyon+ CIEMAT)
- Timing electronics (CMS muon for strip and SJTU for SDHCAL pads):
Board design, **first results expected in ????**.
- Cooling for CEPC (SJTU)
- SJTU lab (SJTU)

Simulation

- ILD SDHCAL simulation/reconstruction performance monitoring (Camilo, CIEMAT)+Guillaume
- Tricot simulation (on hold) **participation from SJTU ?**
- Timing in simulation (developments by Guillaume Garillot → Analysis by Imad)
- Prototype simulation upgrade (Multithreading, CEPC version, ...) (François)

Ongoing activities

grid

- Learning how to run jobs on ILCdirac grid (Gérald)

PFA

- ArborPFA → APRIL (Bo, → GG, on hold).
- AMSTER : potential APRIL reclustering method : Julien Cheynis (M2 internship)
- Rand Index (GG, on hold)
- PFA with timing (Bo+Imad)

Digitisation

- Incorporate GRPC response modelling to digitiser, (Clermont+Lyon).
- Evolution : tricot electronics, independence from Marlin (discussion started)

Ongoing activities

ILD/CEPC Analysis

- $e^+e^- \rightarrow Z \rightarrow \text{jets}$ then $e^+e^- \rightarrow ZH \rightarrow \text{jets}$ (CIEMAT)
- $e^+e^- \rightarrow \gamma\gamma VV$ (Bing did it for CEPC, Imad+Nicolas Chadeau (M2 internship)+ Guillaume for ILC)
- include FCC-ee also ?

AIDAInnova status

- AIDAInnova has started on April Fools' Day(April 1st 2021).
- Kick-off organised April 12-16, 2021
<https://indico.cern.ch/event/1003419>

Work Packages

- PFA (ARTIC) : 50 k€(was EOI #145), in WP 12 Software, task 12.5, deliverable 12.4 (quite generic : provide working PFA)
- SDHCAL + electronics : 50 k€(was EOI #57 and EOI #58), in WP 7 Gaseous detectors for frontier science, task 7.2 and deliverable 7.1 (50 k€, Mary Cruz representative)

SDHCAL removed from high granularity calorimeter WP

AIDAinnova task 7.2

task 7.2 : Multigap RPCs (MRPC) for fast timing and Eco-friendly gas mixtures for RPCs

- Developing and testing material (thin plates of low resistivity glass)
- Construction, characterization and test beam of small-size prototypes
- Construction of $1 \times 1 \text{ m}^2$ prototypes with the new structure read-out plane for SDHCAL
- Test beam study of the shower time development in an SDHCAL, equipped with the prototype detectors
- Identification and characterization of new gas mixture candidates Validation of the gas mixtures after large integrated charges at GIF++

Deliverable 7.1: Characterization of the small size prototypes of MRPCs for fast timing and high rates in 24 months

AIDAinnova task 12.5

task 12.5 : Particle Flow Reconstruction

- Advanced PFA algorithms for DUNE detectors using new readout technologies.
- PFA algorithm with particle ID for dual-readout calorimeters.
- **Optimised APRIL PFA algorithm for hadronic jets** (collaboration with Vincent Boudry, LLR).

Deliverable 12.4 New PFA prototypes (responsible Warwick university)
Improved and documented particle flow algorithms, including machine learning based algorithms, **available in the PandoraPFA toolkit**, suitable for new readout technology detectors.

Meeting at noon today <https://indico.cern.ch/event/1050262/>

AIDAinnova kickoff

- WP3 : task 3.3 Sub-ns timing precision for EUDET, task 3.4 Common DAQ+monitoring (CERN mailing lists AIDAinnova-WP3@cern.ch)
- WP7 : task 7.2 5D SDHCAL, also eco Gas for RPC.
(AIDAinnova-WP7@cern.ch, AIDAinnova-WP7-general@cern.ch)
- WP8 : calorimeters (AIDAinnova-WP8-General@cern.ch)
- WP11 : electronics (includes some OMEGA chips)
- WP12 : software : task 12.3 ML techniques for shower simulation, task 12.5 PFA. (AIDAinnova-WP12@cern.ch)
- WP 13 : call for extra innovative projects, deadline mid july :
<https://indico.cern.ch/event/1003419/contributions/4273255/attachments/2226853/3772291/AIDAINNOVA-210415-krizan.pdf>

Published papers

Recent

- SJTU+Lyon work : JINST 14 (2019) no.10, P10034
<http://inspirehep.net/record/1762795>.
- CHEF 2019 proceedings :
 - JINST 15 (2020) 05, C05016. <https://arxiv.org/abs/2002.09678>
 - JINST 15 (2020) 05, C05022.
<https://inspirehep.net/literature/1826123> 7 pages document available only on journal website.
 - There were 3 SDHCAL talks at CHEF 2019
- BDT paper
 - **Published**, D. Boumediene et al 2020 JINST 15 P10009.
<https://inspirehep.net/literature/1790235>
 - Preprint at <https://arxiv.org/abs/2004.02972>
 - The mismatch between the paper and the CHEF 2019 proceeding is fixed in inspireHEP, in HAL and in CERN CDS
(<http://cds.cern.ch/record/2715408> and
<http://cds.cern.ch/record/2743482>)

Publications

Papers, short term

- Bing Current analysis of test beam data on low energy hadrons (**direct CALICE paper, no note**), CALICE Paper032 EB=Fouz, Cvach, Simon (same as BDT paper).

Notes in preparation

- Bo : APRIL PFA (on hold, **Bo got a position in a chinese university**)
- Hector : analysis with rotated devices.
- GRPC uniformity from test beam data (on hold).
- More on GRPC response modeling by Clermont **Note under CALICE EB review.**

Coming meetings

Recent workshops

- ILD meeting, June 3-4 2021, online, <https://agenda.linearcollider.org/event/9199/>
- ECFA Higgs at ee collider meeting, June 18, 2021 <https://indico.cern.ch/event/1033941/>
- **Yesterday's tutorial** ILC analysis with Delphes and miniDST, June 23, 2021, 3:30pm, online, <https://agenda.linearcollider.org/event/9264/>

Coming workshops

- **CALICE Analysis meeting Next week**, June 30, 2021 online, <https://agenda.linearcollider.org/event/9265/>
- FCC week 2021, June 28-July 2, 2021 online.
- 3rd CEPC Workshop EU Edition, May 4-7, Marseille, **POSTPONED to spring 2021** <https://indico.in2p3.fr/event/20053/>
- "ILC workshop on potential ILC experiments", October 25-29, 2021, Japan.

Coming conferences

Abstract closed

- EPS-HEP 2021, online, July 26-30,
<https://indico.desy.de/event/28202/>.
- PANIC 2020 → PANIC 2021 September 5-10 2021, Lisbon, Portugal,
<https://indico.lip.pt/event/592/> One abstract submitted

Open to abstract

- Pico-second timing detectors, September 22-24, 2021 Zurich, Switzerland,
<https://indico.cern.ch/event/861104/>, abstract is opened, meeting in person.
- Higgs 2021, October 18-22, 2021, Stony Brook, NY, USA,
<https://indico.cern.ch/event/1030068/overview>. abstract up to 07/15/2021
- ACAT 2020 (Advanced Computing and Analysis Techniques in Physics Research) → ACAT 2021 November 29-December 3, 2021, Daejeon, South Korea, <https://indico.cern.ch/event/855454/>, abstract up to 08/29/2021 (PFA ? DAQ ?)

Coming conferences (more)

postponed conferences

- PIC 2020, September 12-17 **2021**, Aachen, Germany,
<https://pic2020.physik.rwth-aachen.de/>
- HEPChile2021, January 4-8 **2021**, Valparaiso, Chile,
<https://indico.cern.ch/event/698387/> (**POSTPONED** to 2022)
- CALOR2020 → CALOR2021 → **CALOR2022**, May 16-20 **2022**, Sussex, UK,
<https://indico.cern.ch/event/847884/> (abstract 12/6/21 to 03/11/22)
- PISA meeting on Advanced Detector 2021, May 23-29 **2021**, Elba, Italy,
<https://agenda.infn.it/event/22092/> **POSTPONED to May 2022**

Coming conferences (more)

Announced date

- Lepton Photon 2021, January 9-14, 2022, Manchester, UK, <https://www.leptonphoton2021.org/>
- ICHEP 2022, July 6-13, 2022, Bologna, Italy, <https://www.ichep2022.it/>.
- Lepton Photon 2023, July 17-21 2023, Melbourne, Australia.

Request from CALICE

News from autumn 2019 CALICE Meeting

- Message from Roman. Clean/update the CALICE twiki page.
<https://twiki.cern.ch/twiki/bin/view/CALICE/SdHCal>

ILD regular meetings

ILD group meeting Next July 6th

- <https://agenda.linearcollider.org/event/9301/>

ILD Analysys/software meeting June 16th

- <https://agenda.linearcollider.org/event/9285/>
- New ilcsoft releases : v02-02-02, to be used to analyse current MC production
- A talk on bbn, cc and ss preselection.

ILD Analysys/software meeting June 23rd

- <https://agenda.linearcollider.org/event/9293/>
- LCIO evolution : suppress Fortran and C access, update RawCalorimeterHit.
- Work on s-tagging.
- Talk by Nicolas Chadeau.

FCC meetings

FCC-ee physics performance meeting June 21st

- <https://indico.cern.ch/event/1050074/>
- Jet tagging, Higgs recoil mass with $Z \rightarrow \mu\mu$.

FCC-ee physics meeting Next July 26th

- <https://indico.cern.ch/event/1019439/>

What about equivalent CEPC meetings ?

IDT WG3 Physics meeting

Open meeting on June 17th

- <https://agenda.linearcollider.org/event/9239/>

Open meeting on July 15th

- <https://agenda.linearcollider.org/event/9254/>
- Next meetings, august 12th, September 16th

MC mass production files

situation

- Overlay bug corrected MC production. Samples have been produced :
 - single muons and K_L^0 : <https://ild.ngt.ndu.ac.jp/elog/dbd-prod/467>
 - inclusive higgs decay of qqH process :
<https://ild.ngt.ndu.ac.jp/elog/dbd-prod/468>

Snowmass 2021

- American particle physics strategy update
- Currently discussed in all future collider projects.
- ILD preparation : LOI, simplified ilcsoft, delphesILC card
<http://ilcsnowmass.org/>
- Energy Frontier workshop was held July 20-22
<https://indico.fnal.gov/event/43963/overview>
- Process planning meeting Oct 5-8,
<https://indico.fnal.gov/event/44870/overview>

Snowmass 2021 and CALICE

Input for the Instrumentation Frontier

<https://snowmass21.org/instrumentation/start>

- Dominant themes for calorimetry : High granularity, Dual Readout, PFA, timing
- CALICE has submitted not 6 but 10 proposals
<https://agenda.linearcollider.org/event/8647/>
 - **Timing-SDHCAL (Imad)**
 - Generic R&D on timing layer in calorimeters (Frank Simon)
 - Scintillator Strip ECAL
 - SiW ECAL
 - Common compact readout for CALICE calorimeters (for ILD option 1) (Katja, Roman, Taikan)
 - AHCAL (Katja, Felix)
 - High granularity crystal ECAL.
 - DHCAL (José).
 - ALICE FoCal improved.
 - New sensors for SiW ECAL.

News from our data

- Our test beams data have been transferred from grid catalogue LFC to DIRAC catalogue and to CERN eos.
- CERN files on EOS have been copied in 2018 from NAS or recently from the path LFC → DIRAC → CERN eos.
- Checksum on files : CERN eos files that were on LFC are identical to those in DIRAC and LFC except for 6 files.
- These 6 files were copied in 2018, they are identical between LFC and DIRAC (likely they were badly transferred to LFC)
- These 6 files are from SPS_AugSep2012 (DHCAL_715572_I0_0.slcio, DHCAL_715572_I1_0.slcio, DHCAL_715572_I2_0.slcio, DHCAL_715572_I3_0.slcio, DHCAL_715573_I0_0.slcio, DHCAL_715651_I0_0.slcio)
- The test beam data in LFC have been deleted.

Outlook

Flash info

- Should we look at Higgs CPV at 1 TeV ?

Don't hesitate to add any important activity, paper, or conference, I may have miss.

Next meetings

Europe (**summer**) 9-11 / China 15-17 / Korea 16-18

- July 8th
- July 22nd (?)
- Summer break

Backup

Past meetings

- LCWS2019, October 28 - November 1 2019, Sendai,
<https://agenda.linearcollider.org/event/8217/> : one talk by Bo on APRIL PFA
- CEPC workshop, November 18-20, IHEP, Beijing,
<https://indico.ihep.ac.cn/event/9960/>, a SDHCAL talk by Bing.
- CHEF2019, November 25-29, Kyushu,
<https://indico.cern.ch/event/818783/> 3 talks (Bing, GG, Djamel)
 - PID with Boosted Decision Tree (Bing)
 - Digitizer (Djamel)
 - APRIL PFA (GG)
- RPC2020, February 10-14, Roma,
<https://agenda.infn.it/event/19942/> **No abstract submitted**
- Spring 2020 CALICE meeting, March 4-6, McGill
<https://agenda.linearcollider.org/event/8343/overview> Very little SDHCAL presence (2 persons)
One talk by Mary-Cruz

Past meetings (II)

- FCC France, May 14-15, By video,
<https://indico.in2p3.fr/event/20792/>
- CALICE analysis meeting, May 20
<https://agenda.linearcollider.org/event/8526/> (one talk by Hector)
- CALICE analysis meeting, July 30, 2020
<https://agenda.linearcollider.org/event/8585/> (one talk by Bing)
- CALICE Collaboration meeting, Sept 28-30, 2020
<https://agenda.linearcollider.org/event/8608/>
- AWLC 2020 (Americas Workshop on Linear Colliders), October 19-22, online
<https://conf.slac.stanford.edu/awlc2020/>
- FCC workshop, November 10-13, 2020, online
<https://indico.cern.ch/event/932973/>
- CALICE analysis meeting, December 10, online
<https://agenda.linearcollider.org/event/9005/>

Past meetings (III)

- IML Machine Learning Workshop, June 2-5 2020, CERN, **POSTPONED to October 19-22** <https://indico.cern.ch/event/852553/> **Lots of potentially interesting talks**
- CPAD Instrumentation Frontier Workshop 2021, March 18-22 (overlap LCWS) <https://www.stonybrook.edu/cfns/cpad2021/index.html> (abstract up to 02/28/2021)
- LCWS Europe, March 15-19, 2021, online <https://indico.cern.ch/event/995633/> **2 talks accepted, April 16 at 11:20 pm and 18 at 11:20 am.**
- CALICE meeting, March 24-26, 2021 online <https://agenda.linearcollider.org/event/9076/overview>
- Workshop on gas transport, April 22, online, <https://indico.cern.ch/event/1022051/overview> **Numerous talks on high GWP gas replacement**
- TIPP 2020 → TIPP 2021, online, May 24-28, 2021 <https://indico.cern.ch/event/981823/> One talk on tricot electronics <https://indico.cern.ch/event/981823/contributions/4295341/>.