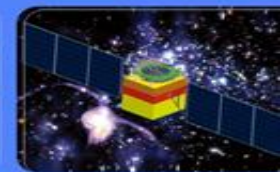


# The Status of the HCAL

2024-11-19

[WWW.IHEP.CAS.CN](http://WWW.IHEP.CAS.CN)



Qian Sen, on behalf of the HCAL Group

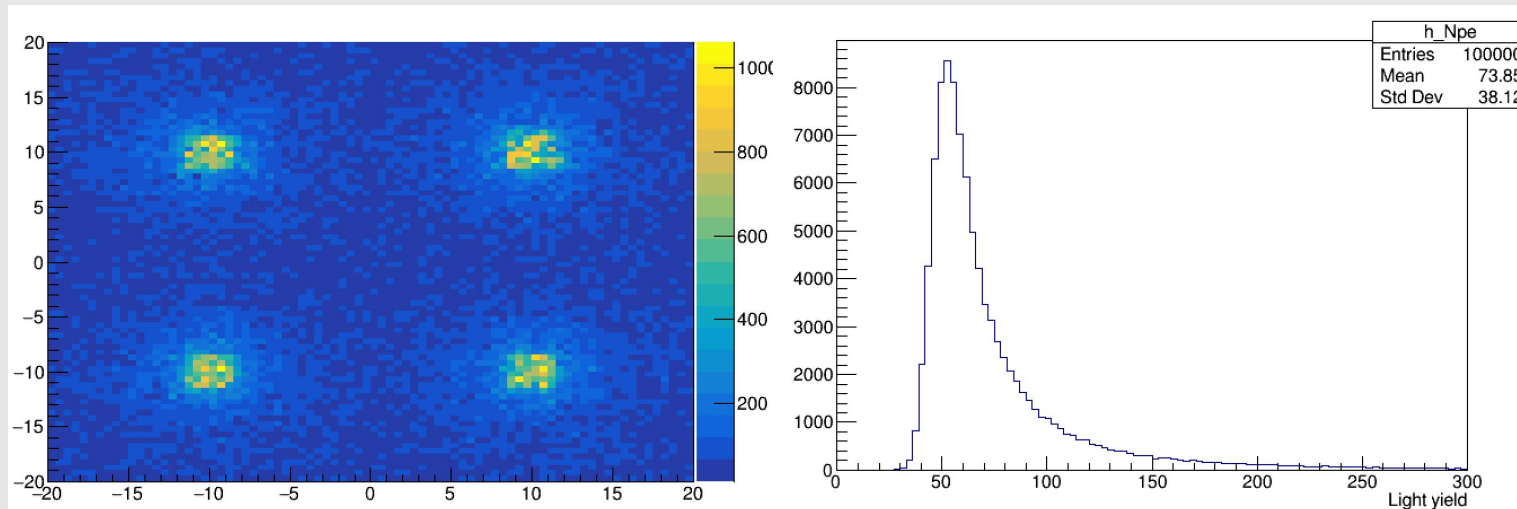
[qians@ihep.ac.cn](mailto:qians@ihep.ac.cn)

# Recent Progress for GS-HCAL--Design+SiPM

--by Fangyi Guo & Hengne Li --by Xie Yuguang, Han Jifeng, Luo Guang

## ■ Optical simulation from Luo Guang: $4 \times 3 \times 3$ mm SiPMs, glass $L_{att} = 2.3$ cm.

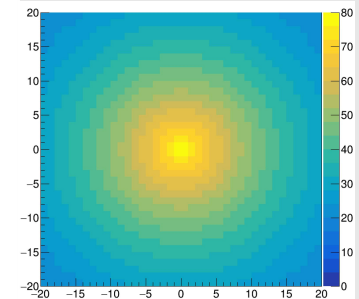
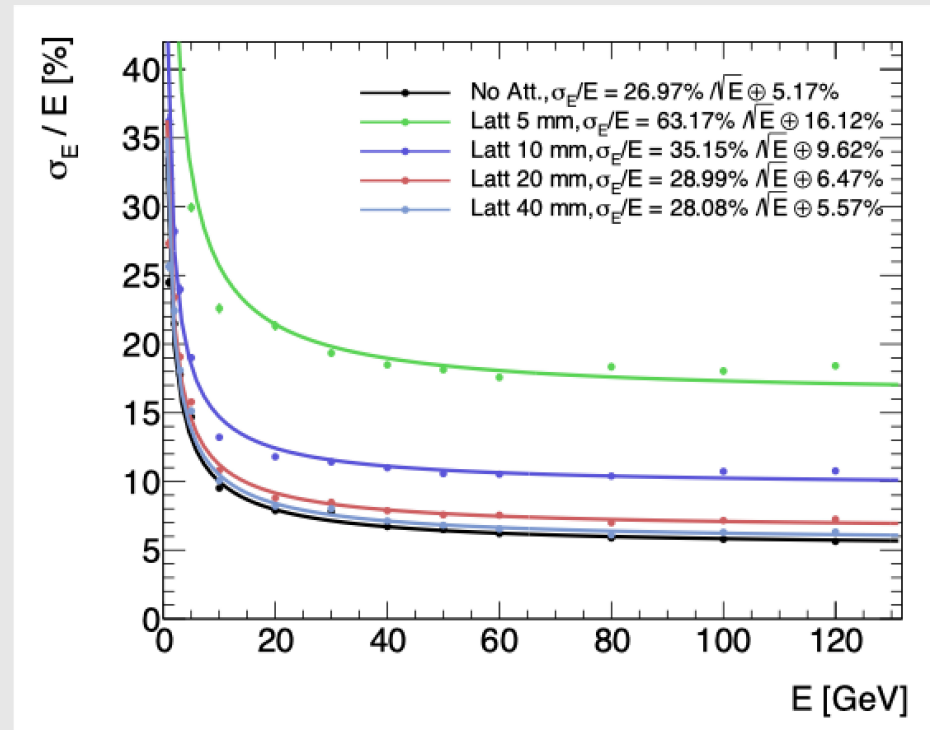
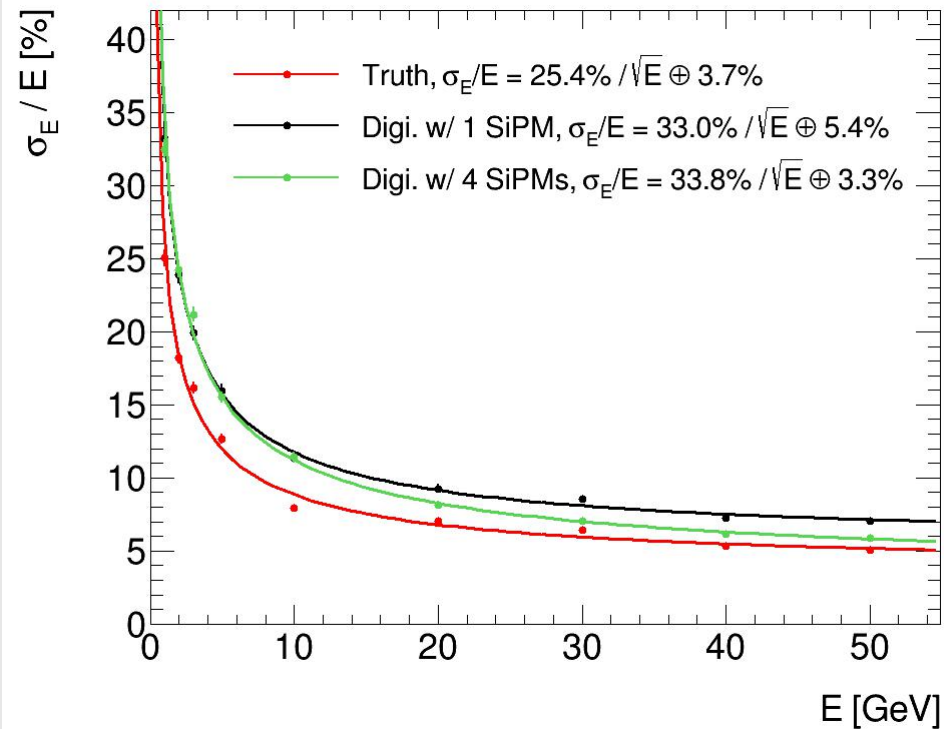
- MIP light yield is embedded in the map:
  - Mean: 88.63 p.e.
  - MPV: 53.4 p.e., width 6.7 p.e.
  - Maximum: 1061 p.e., min 13 p.e.



Parameters	Unit	GS1+
Density	$\text{g/cm}^3$	6.0
Melting point	$^{\circ}\text{C}$	1150
Radiation Length, $X_0$	cm	1.64
Molière radius	cm	2.50
Nuclear interaction length	cm	24.1
$Z_{\text{eff}}$	--	56.9
$dE/dX$	MeV/cm	8.0
Emission peak	nm	390
Refractive Index	--	1.76
Light yield, LY	ph/MeV	2445
Energy resolution, ER	%662keV	25.8
Decay time	ns	101 1456
Attenuation length	cm	2.3

## Energy resolution:

- $\pi^-$  single p,  $\theta \sim 90^\circ$ ,  $\phi \sim 0^\circ$ , Birks constant 0.
- Shower start at first 12 cm (4 layers)
- 4 SiPMs can improve the tile uniformity and reduce the constant term.



Latt = 20 mm  
Edge: 24.3% of center.

# Current status of the GS-HCAL GS

## 玻璃材料同步辐射表征技术研讨会



会议手册

2024年11月14日-16日

北京

中国硅酸盐学会特种玻璃分会

中国科学院高能物理研究所

中国科学院上海光学精密机械研究所

## 会议简介

- 名誉主席:** 干福熹 (中国科学院上海光学精密机械研究所, 中国科学院院士)  
姜中宏 (中国科学院上海光学精密机械研究所, 中国科学院院士)  
王贻芳 (中国科学院高能物理研究所, 中国科学院院士)  
汪卫华 (中国科学院物理研究所, 中国科学院院士)  
彭寿 (中国建材集团有限公司, 中国工程院院士)
- 会议主席:** 胡丽丽 (中国硅酸盐学会特种玻璃分会, 理事长; 中国科学院上海光学精密机械研究所)
- 会议执行主席:** 张龙 (中国科学院上海光学精密机械研究所, 副所长, 研究员)  
董宇辉 (中国科学院高能物理研究所, 副所长, 研究员)
- 组织委员会主席:** 钱森 (中国科学院高能物理研究所, 研究员)
- 组织委员会:** 钱森、郑锐林、王欣、邓路、张星星、贾英华、徐鹤、王涵、蒋芳玲

0. 属于GS合作组在玻璃研究领域的专业化学术论坛, 研讨会。
1. 形成会议纪要: 支持呼吁建立专用线站进行玻璃样品的表征和研究工作;
2. 针对国家重大需求 (CEPC-GS), 联合申请日本、上海光源等线站, 进行GS的表征;
3. 怀柔光源在调试中的线站, 可以接收GS样品一边调试, 一边测试;

# The GS-HCAL talk on the Conference!

- 1. Henne Li, On behalf of the HCAL group, give a talk on CLPC2024;

Contribution list Timetable

Thu 14/11 Fri 15/11 Sat 16/11 All days

Print PDF Full screen Detailed view Filter

14:00	<b>Progress of CEPC ECAL R&amp;D</b> 山东省青岛市鳌山湾 (Aoshan Bay, Qingdao, Shandong)	Yong Liu	14:00 - 14:20
	<b>The Progress of the CEPC GS HCAL</b> 山东省青岛市鳌山湾 (Aoshan Bay, Qingdao, Shandong)	Hengne Li	14:20 - 14:40
	<b>Progress of CEPC VTX detector</b> 山东省青岛市鳌山湾 (Aoshan Bay, Qingdao, Shandong)	梁志均 LIANG Zhijun	14:40 - 15:00
15:00	<b>Jet origin identification at electron positron Higgs factory</b> 山东省青岛市鳌山湾 (Aoshan Bay, Qingdao, Shandong)	永峰 朱	15:00 - 15:20
	<b>Beam Polarization at CEPC</b> 山东省青岛市鳌山湾 (Aoshan Bay, Qingdao, Shandong)	Zhe DUAN	15:20 - 15:40



## Progress of the CEPC GS-HCAL

Hengne Li  
on behalf of the CEPC HCAL Group



# Current status of the GS-HCAL TDR

## Chapter 8 Hadron calorimeter--V2.0: 45P+10P -->

- 8.1 Physics Requirements of HCAL (Ruanmanqi, Yanghaijun) --2P
- 8.2 Design of the GS-HCAL (Lihengne, Guofangyi) --10P
- 8.3 The Glass Scintillator (Renjing, Huazhehao) --10P 80%
- 8.4 The SiPM (Xieyuguang, Hanjifeng) --8P 20%
- 8.5 The Electronics & DAQ (Changjinfan, Lifei)--1P
- 8.6 The Mechanics (Peiyantian, Shangbofeng) --10P 40%
- 8.7 The Detector Layout (Yuboxiang, Zhangyonglong) --5P
- 8.8 The Backup Design --10P
  - 8.8.1 Semi-Digital HCAL based on RPC (SDHCAL) (Yanghaijun) -5
  - 8.8.2 Analogue HCAL based on plastic scintillator (PS-HCAL) (Liujianbei) -5

# Backup

# The Manpower of the HCAL

- 1. The PS-HCAL
  - Jianbei Liu, Haijun Yang, Boxiang Yu, Yunlong Zhang, ……,
- 2. The GS-HCAL : Sen Qian (IHEP)
  - Sub-system: 2 Conveners + others
  - Physics: Manqi Ruan(IHEP), Haijun Yang(SJU),
  - Software: Sengsen Sun(IHEP);
  - Design: Fangyi Guo(IHEP), Hengne Li(SCNU),
  - Glass Scintillator: Sen Qian(IHEP), Jing Ren(HEU), the GS collaboration Group
  - SiPM: Yuguang Xie(IHEP), Jifeng Han(SCU),
  - Electronics: Jingfan Chang(IHEP),
  - DAQ: Chen Boping(IHEP),
  - Mechanics: Yatian Pei(IHEP), Junsong Zhang
  - Detector: Boxiang Yu(IHEP), Yunlong Zhang (USTC),



# The Manpower of the subsystem of GSHCAL

**Physics:** Manqi Ruan(IHEP), Haijun Yang (SJTU) ,

**Software:** Sengsen Sun(IHEP);

**Design:** Fangyi Guo(IHEP), Hengne Li(SCNU), Qingming Zhang(XJTU), Weizheng Song(IHEP), Peng Hu(261)  
Dejing Du(IHEP), Hongbing Diao(SUTC), Jiyuan Chen(SJTU), .....

--to design the GS-HCAL detector based on the CEPCSW;

**Glass Scintillator:** Sen Qian(IHEP), Jing Ren(HEU), the GS collaboration Group;

--R&D of the GS for CEPC-HCAL, a special group independent of CEPC;

**SiPM:** Yuguang Xie(IHEP), Jifeng Han(SCU), Guang Luo(SYSU),

--to do the research of SiPM for CEPC-HCAL, the electronics of SiPM for the GS performance test;

**Electronics:** Jingfan Chang(IHEP),

--to design the ASIC and FEE for CEPC-HCAL; the power supply, the cables and so on;

**DAQ:** Chen Boping(IHEP),

**Mechanics:** Yatian Pei(IHEP), Junsong Zhang(IHEP), Shang Bofeng(ZZU)

--to design the Mechanics of the GS-CEPC-HCAL; also the cell, the module, the cooling system;

**Detector:** Boxiang Yu(IHEP), Yunlong Zhang (USTC)

--to study the module of the GS-HCAL with GS and SiPM, the cosmic ray test, the beam test;