

Innovative scientific and technological cooperation projects of MOST

Cooperation study on the key technology of MPD/ECAL

Review meeting

Tsinghua University

Shandong University

Fudan University

University of South China

October 21, 2021

Review conclusion

Review conclusion:

Electromagnetic calorimeter system is an important detector for NICA/MPD. In order to reduce the false identification of hadrons as electrons (positrons) to large extent, The ECAL should have good energy resolution, adequate space and time resolution. The whole cylindrical ECAL system consist of 2400 ECAL modules. The ECAL module is designed with Shashlyk technology and each module consists of 16 towers. Each tower consists of 220 layer of painted lead plates and plastic scintillators. 16 WLSFs are used to transmit light and the whole tower is readout with one SiPM.

Chinese MPD/ECAL group work on the design and production of ECAL module for many years. They developed two ECAL module prototype and beam test results show that the modules have excellent energy linearity from 1-5GeV and the energy resolution is better than $5\%/\sqrt{E}$, spatial resolution less than 5mm. All of the performances meet MPD requirements. Under the support of MOST project, they work closely with JINR colleagues and set up the whole production line and quality control method.

1. A serials of material and treatment method (such as lead plate painting, polish method of fiber ends and pasting and polishing of Shashlyk tower, et al.) are studied in detail. This study ensure high light collection efficiency of the ECAL module.

2. Professional technicians and modern machines and tools assure the smooth mass production of ECAL modules.

3. The comprehensive measurement and test of each step ensure the quality of each Shashlyk module.

4. Cosmic test results show the performance uniformity of ECAL towers.

5. The dimension and visual check of around 150 modules are in good shape and meet the requirement.

6. The mass production readiness is in very good shape including equipments, techniques and QA and QC. The review committee agree that the mass production can start.

Signature of Chair:










October 21, 2021

Comments and suggestions:

1. The light efficiency of plastic scintillator will decrease with the increase of radiation dose. The project team should do further simulation on radiation to assure ten years of stable working of ECAL system.
2. The committee proposed to have a special work on next year to study the radiation dose of each detector.
3. The cosmic test and analysis at JINR is a hard work and time consuming, the committee suggest that more than 4 technicians or PhD students come to JINR to participate the test and analysis.

Review Committee

	Affiliation	Name	Title	Signature	Time
Chair	JINR	S. Golovatiuk	Professor		2021.10.21
Member	JINR	I. Tyapkin	Professor		2021.10.21
	JINR	Y. Krechetov	Professor		2021.10.21
	JINR	A. Semenov	Professor		2021.10.21
	IHEP, CAS	Jin Li	Professor		2021.10.21
	CCNU	Daicui Zhou	Professor		2021.10.21
	IHEP, CAS	Yuekun Heng	Professor		2021.10.21