

Introductory remarks

Joao Guimaraes da Costa (Beijing)

February 6th 2017



中國科學院高能物理研究所

*Institute of High Energy Physics
Chinese Academy of Sciences*



Hong Kong Conference

- High-Energy Physics, IAS, HKUST: 9-26 Jan 2017
 - Conference: 23-26 Jan 2017
 - <http://iasprogram.ust.hk/hep/2017/conf.html>
 - Talks from Super KEKB, ILC, CEPC, SppC, FCC-ee, FCC-pp, CLIC
 - Major point of discussion:
 - CEPC new size (100 km) and dual-ring design → similar to FCC-ee
 - Good participation of international physicists
 - INFN delegation interested in collaborating in CEPC R&D towards CDR
 - Physics discussion summary: towards CDR today
 - Detector summary: Xin Shi at next meeting



Hong Kong Conference - Experiment/Detector Sessions

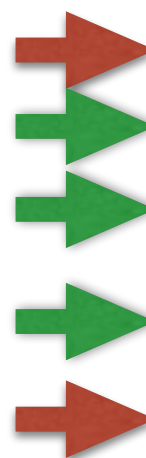
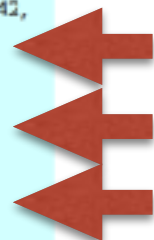
24 Jan 2017 (Tue)

Time	Event	Venue
Chair: Charles Young (SLAC National Accelerator Laboratory)		
09:00-09:45	ILC Technical Status and Readiness Akira Yamamoto (Kō Enerugi Kasokuki Kenkyō Kikō)	IAS Lecture Theater, G/F
09:45-10:30	FCC-ee Michael Koratzinos (CERN)	
10:30-11:00	Coffee break & Group-photo taking	Lobby, G/F
11:00-11:45	CLIC Status Philip Burrows (University of Oxford)	IAS Lecture Theater, G/F
11:45-12:30	Physics at e+e- Colliders Lian Tao Wang (University of Chicago)	
12:30-14:00	Lunch (Self-arranged)	
14:00-15:40	Parallel Session (Accelerator Physics - Part III) Chair: Akira Yamamoto KEK (Kō Enerugi Kasokuki Kenkyō Kikō)	
14:00-14:20	SC Cavity Industrialization Carlo Pagani (University of Milan and Italian Institute of Nuclear Physics)	IAS Lecture Theater, G/F
14:20-14:40	Accelerator RF System Robert Rimmer (Thomas Jefferson National Accelerator Facility)	
14:40-15:00	Super KEKB RF System Tetsuya Kobayashi (Kō Enerugi Kasokuki Kenkyō Kikō)	
15:00-15:20	CEPC rf System Jiyuan Zhai (Institute of High Energy Physics, Chinese Academy of Sciences)	
15:20-15:40	Rf Power Source System Shigeki Fukuda (Kō Enerugi Kasokuki Kenkyō Kikō)	
14:00-15:40	Parallel Session (Experiment / Detector - Part I) Chair: Joao Guimaraes da Costa (Institute of High Energy Physics, Chinese Academy of Sciences)	
14:00-14:20	Detector Optimization and Physics Simulation Toward the CEPC CDR Manqi Ruan (Institute of High Energy Physics, Chinese Academy of Sciences)	IAS2042, 2/F
14:20-14:40	Status of CEPC Calorimeters R&D Haijun Yang (Shanghai Jiaotong University)	
14:40-15:00	Status of CEPC Software Geng Li (Institute of High Energy Physics, Chinese Academy of Sciences)	
15:00-15:20	ILC Software & Grid Usage Jan Strübe (Pacific Northwest National Laboratory)	
15:20-15:40	SUSY Searches at LHC and Beyond Xuai Zhuang (Institute of High Energy Physics, Chinese Academy of Sciences)	

25 Jan 2017 (Wed)

Time	Event	Venue
Chair: Wairen Chou (Fermi National Accelerator Laboratory)		
09:00-09:45	Summary of High Temperature Magnet Workshop Søren Prestemon (Lawrence Berkeley National Laboratory) (Click here for presentation file)	IAS Lecture Theater, G/F
09:45-10:30	Review of ep Colliders Yuhong Zheng (Thomas Jefferson National Accelerator Facility) (Click here for presentation file)	
10:30-11:00	Coffee break	Lobby, G/F
11:00-11:45	Overview of Composite Higgs at Future Collider Ian Low (Northwestern University) (Click here for presentation file)	IAS Lecture Theater, G/F
11:45-12:30	Physics at FCC Michelangelo Mangano (CERN) (Click here for presentation file)	
12:30-14:00	Lunch (Self-arranged)	
14:00-15:40	Parallel Session (Theory - Part III) Chair: Ian Low (Northwestern University)	
14:00-14:20	Electroweak Phase Transition Patrick Meade (Stony Brook University) (Click here for presentation file)	IAS Lecture Theater, G/F
14:20-14:40	Probing Higgs Self-coupling at the LHC and Future Colliders King Man Cheung (National Tsing Hua University) (Click here for presentation file)	
14:40-15:00	Double Higgs Production at the 14 TeV LHC and the 100 TeV pp-collider Gang Li (Peking University) (Click here for presentation file)	
15:00-15:20	Higgs Pair Production in CPV 2HDM Ligang Bai (Chongqing University) (Click here for presentation file)	
15:20-15:40	Vector Z' and Anomaly Cancellation Wai Yee Keung (University of Illinois at Chicago) (Click here for presentation file)	
14:00-15:40	Parallel Session (Experiment / Detector - Part II) Chair: Joao Guimaraes da Costa (Institute of High Energy Physics, Chinese Academy of Sciences)	
14:00-14:20	CEPC TPC Huirong Qi (Institute of High Energy Physics, Chinese Academy of Sciences) (Click here for presentation file)	IAS2042, 2/F
14:20-14:40	A Second Detector Concept for CEPC Franco Bedeschi (Italian Institute of Nuclear Physics) (Click here for presentation file)	
14:40-15:00	Test Beam Results of a Silicon Photomultiplier Based Dual Readout Calorimeter Module Massimo Cacciari (Italian Institute of Nuclear Physics) (Click here for presentation file)	
15:00-15:20	MPGDs: A Tool for Progress in HEP Silvia Galla Torra (Italian Institute of Nuclear Physics) (Click here for presentation file)	
15:20-15:40	Machine Detector Interface for CEPC Qingfei Xu (Institute of High Energy Physics, Chinese Academy of Sciences) (Click here for presentation file)	

15:40-16:10	Coffee break	Lobby, G/F
16:10-17:50	Parallel Session (Accelerator Physics IV) Chair: Wairen Chou (Fermi National Accelerator Laboratory)	
16:10-16:30	CEPC R&D Yunlong Chi (Institute of High Energy Physics, Chinese Academy of Sciences)	IAS Lecture Theater, G/F
16:30-16:50	CEPC Power Source Zusheng Zhou (Institute of High Energy Physics, Chinese Academy of Sciences)	
16:50-17:10	Superconducting Quadrupole for Final Focus Ivan Chumay (Buckner Institute of Nuclear Physics)	
17:10-17:30	Polarized Electrons Source for BINP e-tau Factory Ivan Koop (Budker Institute of Nuclear Physics)	
17:30-17:50	Discussions	
16:10-17:50	Parallel Talks (Experiment / Detector - Part III) Chair: Joao Guimaraes da Costa (Institute of High Energy Physics, Chinese Academy of Sciences)	
16:10-16:30	CEPC Vertex Detector Ping Yang (Central China Normal University)	IAS2042, 2/F
16:30-16:50	SID - An All-silicon Detector for the ILC Manuel Stanitzki (Deutsches Elektronen-Synchrotron)	
16:50-17:10	HV-CMOS Status and Prospects Daniela Badolotto (University of Oxford)	
17:10-17:30	A Drift Chamber Option for the CEPC Franco Grancagnolo (Italian Institute of Nuclear Physics)	
17:30-17:50	Discussions	





International Collaboration

- **INFN, Italy**

- Possible new detector components
 - Full tracker concept, drift chamber tracker, dual readout calorimeter, muon detector
- Electroweak physics studies

- **Taiwan Collaboration**

- Interested in software and physics studies (<https://indico.cern.ch/event/579684/overview>)
 - Luminosity, EW measurements (Sinica), Jet energy scale studies (NCU) and ECAL Studies (Taiwan U)

- **Vinca Institute, Belgrade, Serbia**

- MOU signed with IHEP

- **University of Chicago, USA**

- Young Kee-Kim
 - Chicago/Beijing Workshop, June 5-17 (tentative)

- **Monash University, Australia**

- Tong Li (李佟)

- **University of Liverpool, UK**

- Yanyan Gao, Lecturer

- **Others,**

- Barcelona, Iowa State, Univ. of Geneva, SLAC, Weizmann Institute, Mainz U



Chicago/Beijing Workshop

- **Date: June 5-17 (tentative)**
 - Visiting graduate students (~ 6) from Chicago University
 - Fulvio Piccinini (INFN theorist) — expert in electroweak physics
 - Will invite Lian Tao (Chicago)
 - Explore physics issues that can be tackled in 2 weeks!
 - Needs careful preparation
 - Fast simulation using Delphes card
 - Finish with 1-day workshop at Chicago/Beijing Center with students presenting their results



CDR Organization

- Deadline: end of 2017 → Dec. 15, 2017
- Possibility 1: One detector concept
 - This detector needs to “work” at high-luminosity for Z physics
 - ILD-like (preferable given our pre-CDR) or full Silicon?
 - Consider options:
 - Full silicon (or ILD) and drift chamber (see Grancagnolo’s talk)
 - Dual readout calorimeter
- Possibility 2: Two detector concepts
 - ILD- and SiD-like detectors
 - Would require manpower for full simulation in equal footing of the two concepts
 - Very difficult to achieve within the timescale of 2017



CDR Challenges

- Manpower for making simulation and studies of different options by end of 2017
 - Need help from international partners
- Technical design challenges:
 - TPC operation at large rates
 - MDI design and compensating magnets
 - Beam energy measurement
 - Luminosity measurement
 - Alignment
- Benchmarks:
 - Higgs physics
 - Electroweak physics at Z pole and WW threshold



Detector Pre-CDR Outline

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- 1.2 The Case for the CEPC-SPPC in China
- 1.3 The Science in the pre-CDR
- 1.4 The Accelerator and the Experiment

2 Overview of the Physics Case for CEPC-SPPC

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- 2.2 The Electroweak Phase Transition
- 2.3 Naturalness of the Electroweak Scale
- 2.4 Dark Matter

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Summary

International Review

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 - A.1.1 Introduction
 - A.1.2 Observations
 - A.1.3 Addressing the questions in the charge
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CLIC Detector CDR - and example

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CLIC Detector CDR - and example

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CLIC Detector CDR - and example

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IAS Recommendations

- **Second Meeting of CEPC-SppC International Advisory Committee, Nov. 7-8**

- <http://indico.ihep.ac.cn/event/6440/>

- **Final report recommendations:**

- The detector design and technology choices will profit substantially from experience with state-of-the art **detectors currently in operation** and their upgrades (e.g. LHC and HL- LHC) as well as from ongoing detector developments for **future e+e- colliders** (e.g. ILC, CLIC, and FCC-ee).
 - Exploit synergies with such existing efforts through targeted Chinese contributions to these projects as well as by attracting CEPC participation from these communities.
- Set up **working groups** for the detector optimization and physics benchmark studies with regular meetings that welcome international participants (create mailing lists and use the indico site for remote participation).
 - Where feasible, working groups should be co-chaired by a Chinese and a foreign expert.
- **International participation** can evolve from informal individual contributions to a formal non-engaging MOU with individual institutes or alternatively to an MOU describing tasks and deliverables.
- International involvement can be stimulated by allocating **CDR/TDR editorial roles** (main co-editor or chapters co-editor) to foreign participants.
- No need to repeat full-detector simulation studies for many sub-detector technology options. Once the requirements are understood, specifics of **alternative sub-detector technologies** can be addressed individually.
 - CDR and the physics benchmarks can generally focus **on one detector concept**, while alternative technology options can be mentioned in the sub-detector chapters of the CDR.
- Limit the investment in detector technology **R&D to critical elements** where CEPC requirements are challenging and not yet proven in existing prototypes.
- The **TPC technology** may not meet the requirements for detector operation at the Z-peak (in view of the expected high rates and ion feedback issues).
 - Assess this issue at an early stage and taking a timely decision on whether the TPC is an optimal choice for the CEPC tracker.



Organizational Matters

- CEPC detector/physics website update
 - Internal and external version
- Social communication tool
- Speakers/talk review committee
- Project management software



Agenda

- **Today**

- Physics & simulation issues towards the CDR

Monday, 6 February 2017

15:00 - 15:25	Introduction (15 + 10 min) 25'	▼
	Speaker: Joao Guimaraes da Costa (IHEP)	
15:25 - 15:50	Physics & Simulation -- Status and CDR preparation (15 + 10 min) 25'	▼
	Speaker: Mr. Manqi Ruan (IHEP)	
15:50 - 16:15	Electroweak Physics Towards the CDR (15 + 10 min) 25'	▼
	Speaker: Prof. Zhijun Liang (IHEP)	
16:15 - 16:40	Physics Higgs Towards the CDR (15 + 10 min) 25'	▼
	Speaker: Dr. Gang LI (Experimental Physics Division, Institute of High Energy Physics)	
16:40 - 17:00	Discussion 20'	▼

- **Next meeting, February 20,** 3? pm (Beijing time)

- Is 3 pm OK for future meeting?
- Detector issues toward the CDR
 - Summary of detector presentations from Hong Kong — Xin Shi