

# Introductory remarks

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April 3, 2019



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*Institute of High Energy Physics  
Chinese Academy of Sciences*



# Agenda

## CEPC Physics and detector plenary meeting

Wednesday, 3 April 2019 from **15:00** to **18:40** (Asia/Shanghai)  
at **IHEP ( A623 )**

Manage ▼

### Vidyo Info

Room Name

CEPCDP

Link

<http://vidyo.ihep.ac.cn/flex.html?roomdirect.html&key=cYMGQNUkDuREvkXhIbYRcpUIkI>

Extension

### Wednesday, 3 April 2019

- |               |   |   |
|---------------|---|---|
| 15:00 - 15:20 | Introduction and News 20'<br>Speaker: Joao Guimaraes Costa  | ▼ |
| 15:20 - 15:50 | MOST 2 chip design for Vertex detector 30'<br>Speaker: Mr. Wei WEI Wei (高能所)  | ▼ |
| 15:50 - 16:20 | Summary of calorimeter workshop 30'<br><i>Summary of CEPC Calorimeter workshop: <a href="https://indico.ihep.ac.cn/event/9195/">https://indico.ihep.ac.cn/event/9195/</a></i><br>Speaker: Dr. Yong Liu (Institute of High Energy Physics) | ▼ |
| 16:20 - 16:40 | New CEPC software framework 20'<br>Speaker: Dr. Gang LI (EPD, IHEP, CAS)  | ▼ |
| 16:40 - 17:00 | Update on the TPC R&D 20'<br>Speaker: Dr. Huirong Qi (Institute of High Energy Physics, CAS)  | ▼ |



# News

- **CDR update:**

- Would like to make one update of CDR to include some missing names from the authorship list. Please send **now** to Zhaoru (zhangzr@ihep.ac.cn) **any requests** for additions.
- We will do this ONLY this **one time**.

- **CEPC Topical Workshop: Theoretical Uncertainty Controls for the CEPC measurements**

- IHEP, April 4, 2019

- **CEPC Workshop European Edition 2019**

- Oxford, April 15-17, 2019

- **CEPC MOST2 Pixel Detector, Satellite Meeting , Oxford**

- Oxford, April 17, 2019 - afternoon 2 pm

- **2019 International Workshop on CEPC**

- Beijing, November 18-20



# CEPC Topical Workshop

## CEPC Topical Workshop: Theoretical Uncertainty Controls for the CEPC measurements

Thursday, 4 April 2019 from 08:30 to 18:00 (Asia/Shanghai)

Support Email: [niuwy@ihep.ac.cn](mailto:niuwy@ihep.ac.cn) Telephone: +86 01088236054

Thursday, 4 April 2019

08:30 - 17:30

### Agenda

09:00 **Bhabha scattering 1h20'**

Speaker: Andrej Arbuzov

10:40 **Overview of the Generator MCSANee 1h20'**

Speaker: Renat Sadykov

14:00 **One-loop EW corrections for the process  $ee \rightarrow \gamma\gamma, \gamma\gamma \rightarrow ee$  (Vitalii Yarmolchik) 1h20' (A415)**

Speaker: Yahor Dydyshka

15:40 **Helicity amplitudes for bremsstrahlung  $2f \rightarrow 2f(\gamma), 2f \rightarrow 2b(\gamma)$  1h20'**

Speaker: Yermolchyk Vitaly



# CEPC Workshop, Oxford

## Plenary: Monday, morning

09:00	<b>Introductions and goals</b> <i>Oxford</i>	<i>Prof. Daniela Bortoletto</i> 09:00 - 09:15
	<b>Physics Motivation</b> <i>Oxford</i>	<i>Matthew Philip Mccullough</i> 09:15 - 09:45
	<b>FCC Status</b> <i>Oxford</i>	<i>Alain Blondel</i> 09:45 - 10:15
10:00	<b>CepC Machine</b> <i>Oxford</i>	<i>Jie Gao</i> 10:15 - 10:40
	<b>Coffee Break</b> <i>Oxford</i>	10:40 - 11:10
11:00	<b>ILC Status</b> <i>Oxford</i>	<i>Marcel Stanitzki</i> 11:10 - 11:40
	<b>CLIC STATUS</b> <i>Oxford</i>	<i>Aidan Robson et al.</i> 11:40 - 12:10
12:00	<b>CepC- Detector &amp; Physics</b> <i>Oxford</i>	<i>Joao Barreiro Guimaraes Da Costa</i> 12:10 - 12:35
	<b>CepC: CDR</b> <i>Oxford</i>	<i>Marcel Vos</i> 12:35 - 12:55





# CEPC Workshop, Oxford

Parallels:  
Monday, afternoon

Physics

Simulation  
and Tools

Detector R&D

Accelerator

14:00	HL-LHC Higgs physis	Marianna Testa	Full Silicon Tracking	Oxford	CEPC collider ring	Oxford	Ultra-granular ECAL R&D for CEPC	Zhigang Wang
	Higgs combination at CEPC	Kaili Zhang	Fast Simulation Tracking	Oxford	CEPC booster and damping ring	Dr DOU WANG	Ultra-granular HCAL R&D for CEPC	Haijun Yang
	Higgs to tautau at CEPC	Dan YU	Machine Learning Tracking	Oxford	CEPC beambeam and DA with magnet error and ...	Yuan Zhang	Dual-Readout Calorimeter recent deve...	Iacopo Vivarelli
15:00	EW measurement overview	Zhijun Liang	PFA progress at IPNL	Bo Li Oxford 15:00 - 15:15	CEPC linac injector	Jingru Zhang Oxford 15:12 - 15:36	A Crystal Calorimeter option for CEPC	Chris Tully
	WW threshold scan	Peixun Shen	HGCAL reconstruction...	Jan Kieseler	CEPC Z-pole polaziation	zhe duan Oxford 15:36 - 15:56	CMS HGCAL upgrade	Vito Palladino Oxford
	Theory requirements...	Janusz Gluza	Silicon Tracker Particle Identification				CALICE status report	Imad Laktineh Oxford
16:00	Tea Break							16:00 - 16:30
	Future frontiers of precision Higgs physics	Ian Low	Shower simulations with Machine Learning T...	Sofia Vallecorsa	Introduction and overview	Oxford	CEPC plasma injector scheme	
			Jet Flavor identification	Li Gang	Update on FCCee TDAQ studies	Oxford	DESY plasma accelerator	Jens Osterhoff
17:00					Triggerless readout: LHCb	Oxford	INFN Dafne Test facility	
	Theory implications of a precision Higgs program		Jet Clustering and WW-ZZ ...	Manqi RUAN	Triggerless readout: DUNE	Karol Hennesy	IHEP Superconducting Facility status: PAPS	YUNLONG CHI
	Probing the scale of new physics at e+e- colliders	Hong-Jian He	Jet reconstruction and calibra...	Rosa Simoniello	Front-end link developments	Oxford	CEPC radiation protection	
18:00	Exotic Higgs decays		b/c jet Identification with ML techniques		Timing and control systems	David Cussans		
					ATLAS FELIX system	Oxford		
			Tau identification	Trevor Vickey				



# CEPC Workshop, Oxford

Parallels:  
Tuesday, morning

**Physics**

**Simulation  
and Tools**

**Detector R&D**

**Accelerator**

09:00	Higgs decays to long lived particles	CEPC booster magnets an...	Detector R&D: Muon detectors	Tools and Simulation - Physics common session
	Probing leptogenesis a... <i>Juraj Klarić</i>	CEPC collider ring magnets <i>Mei Yang</i>	<i>Joao Barreiro Guimaraes Da Costa, Liang...</i>	<i>Biagio Di Micco, Manqi...</i>
	Electroweak phase transition	Dual aperture iron yoke SC quadrupole for Super Char...		
10:00	Heavy resonances as a BSM interpretation of a potentia...	CEPC vacuum sy... <i>Dr Haiyi Dong</i>	Oxford 09:00 - 10:30	Oxford 09:00 - 10:30
	Coffee Break Oxford 10:30 - 10:50			
11:00	Rare and forbidden decays (FCNC) and new physics	Computing challenges ... <i>xiaomei zhang</i>	Characterisation of JadePi... <i>Hongbo Zhu</i>	CEPC high efficiency klystron <i>zusheng zhou</i>
	Rare Z decays and lepton universality	The CEPC software and Si... <i>Dr Tao Lin</i>	Full size pixel chip for hig... <i>Wei Wei et al.</i>	CEPC SCRF system <i>Peng Sha</i>
	cLFV in tau decay on the Z pole	The FCCSW software <i>Valentin Volk</i>	Status of ARCADIA project Oxford	Oxford 11:20 - 11:50
12:00	Light mesons from tau decays	ATLAS computing model Oxford	HV-CMOS research for low-mass detectors	High field high Q large grain rf cavity Oxford
	CKM from leptonic and semileptonic B/Bs/Bc/Lam...	Discussion Oxford 12:25 - 12:50	Mu3e ultra-low mass pixel dete... <i>Kirk Arndt</i>	CEPC cryogenic system
	Two-photo and ISR physics <i>Igor Boyko</i>		Low-mass vertex stru... <i>Joel Goldstein</i>	Oxford 12:20 - 12:50



# CEPC Workshop, Oxford

Parallels:  
Tuesday, morning

Physics

Simulation  
and Tools

Detector R&D

Accelerator

14:00	Mixed EW-QCD corrections to Higgs boson production ... Yu Jia	Full G4 detector simulation ... Chengdong Fu	Status of R&D for the Time projection chamber Oxford	CEPC MD Sha Bai et al. Oxford 14:00 - 14:24
	Soft gluon evolution beyond leading order Dr Dingyu Shao	Wire Chambers Oxford 14:20 - 14:35	TPC technologies challenges Oxford	CEPC background Hongbo Zhu Oxford 14:24 - 14:48
	Exotic hadron and spectroscopy with heavy ... Marek Karliner	Muon Simulation Oxford 14:40 - 14:55	Drift chamber tracker design experiences Oxford	CEPC radiation protection Oxford 14:48 - 15:12
15:00	Opportunity on charm at Z pole Marek Karliner	Simulation of IDEA with Delphes	CMS full silicon tracker experience Oxford	CEPC instrumentation and feedback system Dr Junhui Yue Oxford 15:12 - 15:36
	ATLAS full silicon tracker design Oxford	Calorimeter simulation Zhaochang		CEPC mechanics system Oxford
	CMOS technology for large silicon tracker Oxford	Shower simulations with Machine Learning Tech...		
16:00	Tea Break Oxford 16:00 - 16:20			
17:00	The IDEA detector concept performance Roberto Ferrari	CEPC civil engineering TDR design Suyu Xiao Oxford 16:20 - 16:50	Joint physics and simulation Biagio Di Micco, Jianming Qian, Lian...	
	Performance of the CEPC Particle Flow Detector Concept	CEPC Installation, logistics and Projectwise coordination design platform Dr Lei Ye Oxford 16:50 - 17:20		
	Performance of the CLIC-like detector ... Emilia Leogrando	SppC machine design in relation with CEPC Dr Xinkai Chen Oxford 17:20 - 17:50		
	Summary of CEPC Calorimeter Workshop	SppC HTC magnets Qingjin XU et al. Oxford 17:50 - 18:20		
18:00	LumiCal Design and Challenges for Luminosity Measurement			
	Summary of the Workshop Discussion ... Biagio Di Micco			





# CEPC Workshop, Oxford

## Plenary: Wednesday, morning

Summary talks  
from four parallel  
sessions

	<b>Summary of PS1</b> <i>Oxford</i>	08:30 - 09:00
09:00	<b>Summary PS2</b> <i>Oxford</i>	09:00 - 09:30
	<b>Summary PS3</b> <i>Oxford</i>	09:30 - 10:00
10:00	<b>Summary PS4</b> <i>Oxford</i>	10:00 - 10:30
	<b>Coffee</b> <i>Oxford</i>	10:30 - 10:50
11:00	<b>Round Table</b>  Alain Blondel, Eric Kasjfasz, Benno List, Michelangelo Mangano, Nadia Pastrone, Mark Thomson, Yifang Wang	
12:00	<i>Oxford</i>	10:50 - 12:30
	<b>Conclusion</b> <i>Oxford</i>	Nima Arkani-Hamed 12:30 - 13:00
13:00		



# IAC Report - Recommendations

- Physics and Detector Recommendations
  - I) Establish an expert **Detector R&D Committee**, set up with input from the international community, which should oversee detector-related R&D activities. Once established, this committee could become recognized by the international authorities (e.g. funding agencies). Such a committee could evolve in due time to become the body reviewing, and recommending for approval, of the **CEPC detector collaborations**. This committee should be established expeditiously.
- Seeking input for international members of this committee. Please send me email with suggestions.
  - Aiming to cover a broad range of countries.
- Committee expected to be defined by Oxford Workshop



# IAC Report - Recommendations

- Physics and Detector Recommendations
  - 2) Prepare **comprehensive progress reports** on detector development work (R&D of technologies, engineering and integration studies, software and computing, and physics performance) **in due time (2-3 years)**, preceding Letters of Intent, to be reviewed by the Detector R&D Committee.
    - We are not working on TDRs, which makes it a little confusing. These reports are supposed to be produced by 2021-2022.
  - 3) Strengthen the **theoretical physics effort from Chinese institutions** for the CEPC.
  - 4) Incorporate in the physics studies the implications of a run at collision energies at and above the  **$t\bar{t}$ -bar threshold**. This will have an impact not only on the determination of the top quark properties (mass, EW couplings, and indirect sensitivity to the  $t\bar{t}H$  vertex), but also on Higgs measurements, via the vector boson fusion process.



# Summary on IAC

- Re-organize structure to include international colleagues in the leadership structure
  - **Collect nominations for subgroups leadership**
    - Goal was appointments by the Oxford workshop, but we just didn't work on this. Suggest to collect nominations now and appoint people soon after the workshop.
- Plan for a detector progress report (Pre-TDR) by ~2021 (2-3 years from now)
- Focus on detector R&D and try to attract international participation to these activities



# Physics topics in need of further exploration

- tt-bar threshold physics.
  - top quark properties (mass, EW couplings, and indirect sensitivity to the ttH vertex)
  - Higgs measurements, via the vector boson fusion process.
- From CDR international review report:
  - We encourage the CEPC study group to continue and extend the effort to explore the potential of CEPC beyond the established Higgs/electroweak programme.
    - Expand flavor physics studies
    - Expand QCD physics studies
  - Further recommendations for New Physics Searches, EW precision measurements and Higgs
  - Document synergy of HL-LHC





# Further points

- Compare sub-detector options on equal footing
  - Requires an extend MC simulation framework to be shared
  - Need for detector R&D people to get involved in the simulation of their own detectors
- Check detector operability at the highest luminosities possible at the Z-pole
  - Make careful studies of background effects on all detectors
- Develop a common power management structure taking into account the specificity of CEPC
  - Provide solid power consumption estimates for all sub-systems