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# W/Z physics in CDR

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IHEP,CAS

# CEPC W/Z physics Plan for CDR

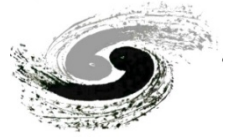


- Plan to cover the prospects of 6-7 key parameters.
- All studies needed to update to CEPC\_v4 geometry
  - With 240GeV for W mass direct measurement.
- Plan to have First draft of CDR about W/Z physics ready by end of May.
  - <http://cepcgit.ihep.ac.cn/cepcdoc/CDR>

Observable	LEP precision	CEPC precision	CEPC runs	$\int \mathcal{L}$ needed in CEPC
$m_Z$	2 MeV	0.5 MeV	Z threshold scan runs	1ab <sup>-1</sup>
$m_W$	33 MeV	2-3 MeV	WW threshold, ZH runs	5ab <sup>-1</sup>
$A_{FB}^b$	1.7%	0.1%	Z threshold scan runs	1ab <sup>-1</sup>
$\sin^2 \theta_W^{\text{eff}}$	0.07%	0.01%	Z threshold scan runs	1ab <sup>-1</sup>
$R_b$	0.3%	0.05%	Z pole	1ab <sup>-1</sup>
$N_\nu$	1.7%	0.05%	ZH runs	5ab <sup>-1</sup>
$R_\mu$	0.2%	0.01%	Z pole	1fb <sup>-1</sup>

# new samples with new detector geometry

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- Gang Li has produced new MC samples with CEPC\_v4 geometry
  - Many Thanks to Gang
- WW and ZZ at 240GeV with CEPC\_v4 geometry ( 1M for ZZ and 1M for WW )
  - ZZ stdhep : /cefs/data/stdhep/CEPC240/4fermions/E240.Pzz\_sl.e0.p0.whizard195/  
ZZ after reconstruction slcio : /besfs/groups/higgs/data/SimReco/wo\_BS/CEPC\_v4/zz\_sl/data/  
  
WW stdhep: /cefs/data/stdhep/CEPC240/4fermions/E240.Pww\_sl.e0.p0.whizard195/  
WW after reconstruction slcio : /besfs/groups/higgs/data/SimReco/wo\_BS/CEPC\_v4/ww\_sl/data/
- Z->bb, Z->cc and Z->light jets with CEPC v4 geometry (0.11M for each flavor)
  - /besfs/groups/higgs/data/SimReco/wo\_BS/CEPC\_v4/zpole/data/rec/

# News: CEPC Workshop



- CEPC workshop
  - 24-26 May 2018
  - *Università degli Studi Roma*
  - <https://agenda.infn.it/conferenceDisplay.py?confId=14816>

**Workshop on the Circular  
Electron-Positron Collider**

**EU Edition**

Roma, May 24-26 2018  
University of Roma Tre



<https://agenda.infn.it/conferenceDisplay.py?ovw=True&confId=14816>

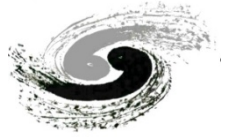
**Scientific Committee**  
Franco Bedeschi - INFN, Italy  
Alain Blondel - Geneva Univ., Switzerland  
Daniela Bortoletto - Oxford Univ., UK  
Manuela Boscolo - INFN, Italy  
Biagio Di Micco - Roma Tre Univ. & INFN, Italy  
Yunlong Chi - IHEP, China  
Marcel Demarteau - ANL, USA  
Yuanming Gao - Tsinghua Univ., China  
Joao Guimaraes da Costa - IHEP, China  
Gao Jie - IHEP, China  
Gang Li - IHEP, China  
Jianbei Liu - USTC, China  
Xinchou Lou - IHEP, China  
Felix Sefkow - DESY, Germany  
Shan Jin- Nanjing Univ., China  
Marcel Vos - CSIC, Spain

**Local Organizing Committee**  
Antonio Baroncelli - INFN, Italy  
Biagio Di Micco - Roma Tre Univ. & INFN, Italy  
Ada Farilla - INFN, Italy  
Francesca Paolucci - Roma Tre Univ. & INFN, Italy  
Domizia Orestano - Roma Tre Univ. & INFN, Italy  
Marco Sessa - Roma Tre Univ. & INFN, Italy  
Monica Verducci - Roma Tre Univ. & INFN, Italy



# Backup

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# Related talks in CEPC workshop

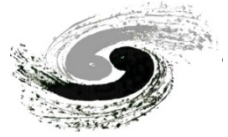


Parallel 2	Physics	14:30	17:00	2:30	F. Piccinini, R. Manqi	
	Z pole+WW	14:30	15:15	0:45		P. Azzurri
	Z+Higgs	15:15	16:00	0:45		Yaquan Fang
	top	16:00	16:30	0:30		M. Vos
	BSM	16:30	17:00	0:30		B. Mele
Parallel 2c	Physics/Sim.	14:30	16:30	2:00	Patrizia Azzi, Yaquan Fang, Gang Li, Jenny List	
	H->invisible	14:30	15:00	0:30		Xin Shi Confirmed
	Precision Higgs Combination	15:00	15:30	0:30		Kaili Zhang Confirmed
	Machine learning for ee	15:30	16:00	0:30		Sofia Vallecorsa Confirmed
	Physics at the Z pole	16:00	16:30	0:30		Zhijun Liang Confirmed
	W mass measurement	16:30	17:00	0:30		Hengne Li Confirmed
Parallel 2d	Physics/Sim.	17:00	18:30	1:30	Patrizia Azzi, Yaquan Fang, Gang Li, Jenny List	
	ee->ZH ISR correction	17:00	17:30	0:30		Mario Greco Confirmed
	W mass measurement	17:30	18:00	0:30		Hengne Li Confirmed
	2HDM at ee	18:00	18:30	0:30		Bruce Mellado Confirmed

Welcome Dr. Hengne Li joining CEPC electroweak study

# Reminder of CEPC W/Z runs

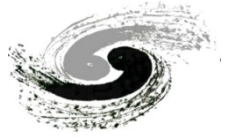
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- **Some discussion about CEPC Z pole running .**
  - <http://indico.ihep.ac.cn/event/7709/>
    - E=240GeV, L=1.6 X 10<sup>35</sup> cm<sup>-2</sup>s<sup>-1</sup>, solenoid field = 3T ( new default )
    - Two year running proposed by accelerator team
- **WW threshold scan**
  - Proposal from accelerator team
  - One year running about 160GeV
  - Total luminosity 3.2 ab<sup>-1</sup>

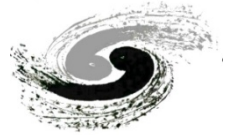
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# Performance input



- Identify some performance input needed to support the W/Z physics prospect study
  - May need to repeat some study with 3T magnetic field and new detector geometry
- $A_{fb}(l)$ : lepton angular resolution
- $R_b$ : “B jet efficiency” vs “cjet/light rejection”
- W mass (direct approach) : jet energy resolution
- W mass (threshold scan): ?
- $N_v$  : photon energy resolution

