

# Summary of Working Groups (theory)

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# Contents

- Main goals
- History of working groups
- Working groups and their highlights
- Discussions on future activities

# Main goals

- Dig physics potential of CEPC/SPPC based on worldwide endeavor
- Form a written report
- .....

# Where are we (theory organization)

- 2012/11/7, the theory working group formed
- 2012/12/20, first group meeting at Tsinghua U
- 2013/8/25, small scale meeting at Dalian (TeV working group workshop)
- 2013/9/14, Kick-off meeting, adding “flavor” and “TeV cosmology” working groups
- 2013/11, second group meeting at Peking U
- 2013/12/16, preliminary report
- 2014/1, adding “heavy ion” working group

# General remarks for the theory workgroups

- Everyone are welcome to join and contribute!
- New results are encouraged to be published at journals. Hope to stimulate new projects and collaborations.

# Clear Physics goal for CEPC/SPPC

- **Is the  $X(125)$  the SM Higgs boson**, by measuring its properties, mass/spin/CP nature/couplings with fermions/gauge bosons/itself...?
- **Is there new physics**, by discovering deviations from SM prediction/new decay modes of  $X(125)$  and possible new particles.....?

# 7 working groups

- SM tests (conveners: Qing-hong Cao/Li-lin Yang/Zhao Li/Chong Sheng Li)
- Higgs Physics (Hong-jian He/Shou-hua Zhu/Tao Liu)
- BSM: SUSY (Tianjun Li/Jin-min Yang)
- BSM: Non-SUSY (Qi-shu Yan/Jing Shu/Wen-Gan Ma/Yi Liao/Wei Liao)
- Flavor Physics (Cai-Dian Lu/Zong-Guo Si)
- TeV Cosmology (Xiao-jun Bi/Yu-Feng Zhou)
- MC tools (Qi-shu Yan)
- Heavy Ion (Xin-nian Wang/Qun Wang)

# Physics at Circular Electron-Positron Collider (CEPC) and Super Proton-Proton Collider (SPPC)

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~40 authors, more to be added



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~200 pages

# Talks from sub groups

- Yesterday: Neutrino Physics (Yi Liao, Nankai University)
- 9:00 - 9:30 Higgs (Tao Liu, Hong Kong Univ. of Science and Technology)
- 9:30 - 10:00 BSM: SUSY (Jin Min Yang, ITP)
- 10:30 - 11:00 BSM: non-SUSY (Jing Shu, ITP)
- 11:00 - 11:30 SM tests ( Qing-Hong Cao, Peking Univ.)
- 11:30 - 12:00 Cosmology(Xiao-Jun Bi, IHEP)
- 2:00- 2:30 Flavor (Zhenjun Xiao, Nanjing Normal Univ.)
- 2:30 - 3:00 Top Physics (Zong-guo Si, Shandong Univ.)
- 3:00 - 3:30 MC tools (Qi-Shu Yan, UCAS)

# Highlights of WG (1)

- Higgs: Precise measurements on Higgs boson/rare decay of Higgs boson/new Higgs bosons...
- SUSY: Possible light SUSY particle and virtual effects at CEPC/high reach for higher energy SPPC
- NON-SUSY BSM: dynamical EW symmetry breaking/ED/Neutrino and its underlying mechanism at colliders.....

# Highlights of WG (2)

- SM test: Untouched regime ( $Z_{tt}$  coupling etc), multiple  $W/Z$  physics....
- Flavor: Top charge asymmetry/top spin correlation...
- TeV cosmology: DM/baryon-genesis
- Heavy Ion: Property of QGP differs,  $J/\Psi$  suppression...
- MC tools: at least NLO precision...

# Summary

- Great effort, great progress!
- Still lots, lots of works to do. A challenging task!
- Count on contributions from everyone, especially conveners of subgroups

# Proposed deadline

- 1<sup>st</sup> WG workshop in May(or June), and the version 1.0 report?
- 2<sup>nd</sup> WG workshop in July (or August), and the version 2.0 report?
- Subgroup final report, Sept. 1(or Oct. 1), 2014
- Submitted report, Dec.1, 2014!