

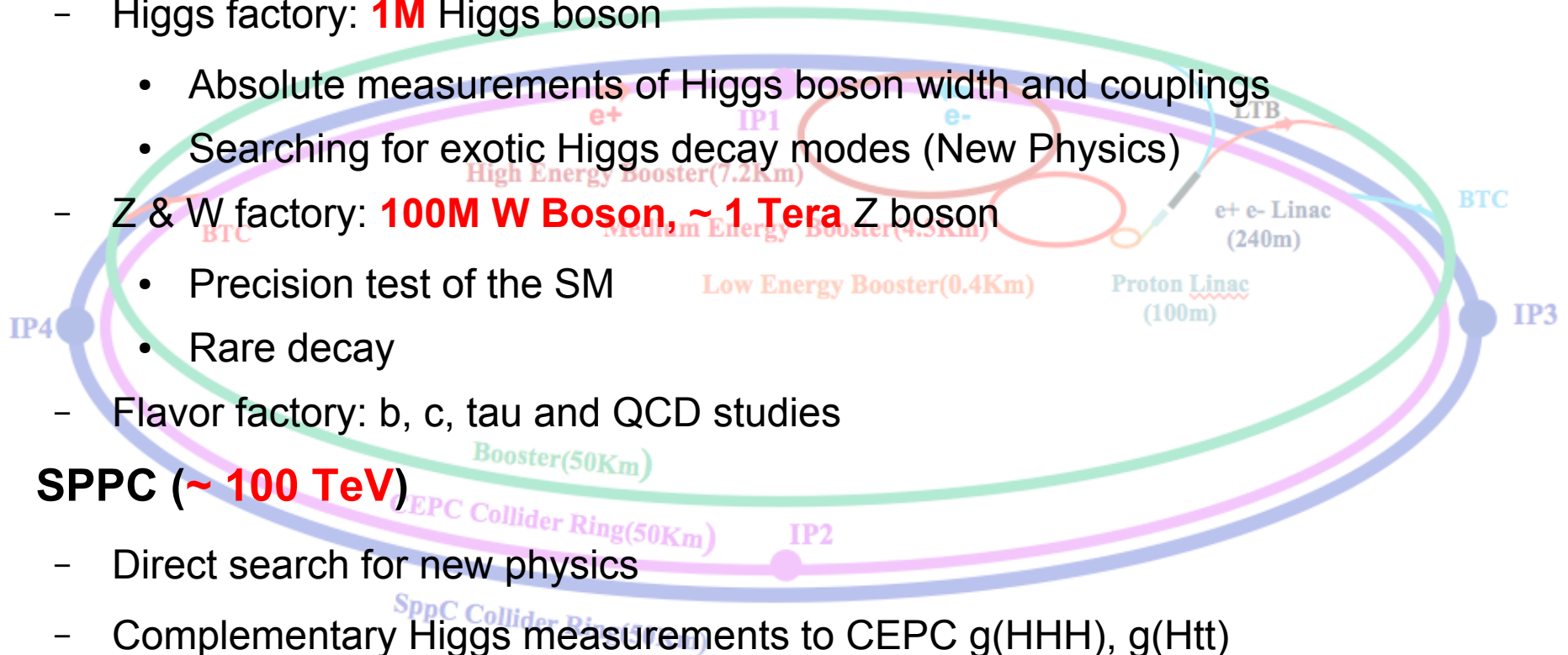


# *CEPC: Snowmass & Physics Whitepapers*

Manqi Ruan

# Science at CEPC-SPPC

- Tunnel ~ **100 km**
- CEPC (90 – 250 GeV)
  - Higgs factory: **1M** Higgs boson
    - Absolute measurements of Higgs boson width and couplings
    - Searching for exotic Higgs decay modes (New Physics)
  - Z & W factory: **100M W Boson, ~ 1 Tera Z boson**
    - Precision test of the SM
    - Rare decay
  - Flavor factory: b, c, tau and QCD studies
- SPPC (~ **100 TeV**)
  - Direct search for new physics
  - Complementary Higgs measurements to CEPC g(HHH), g(Htt)
  - ...
- Heavy ion, e-p collision...



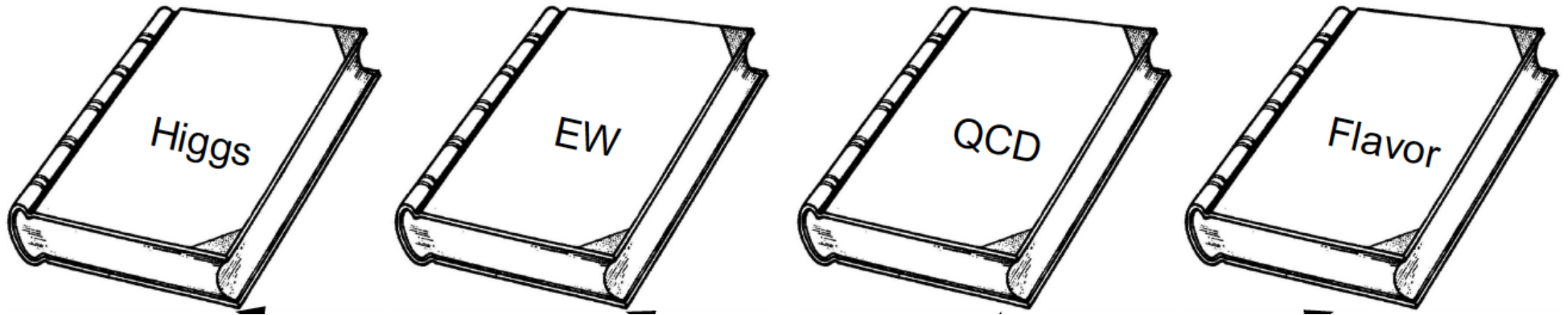
**Complementary**

# CDR released in Nov. 2018



- Higgs Physics Potential: Very well quantified in CDR
- More studies & Quantifications, is actually needed for other Physics searches:
  - EW, Flavor, QCD, BSM...

# Objectives of this workshop



- To promote the physics study at TDR & to converge to the Physics White Papers
- Physics white papers:
  - Physics handbooks for new comers: PostDoc/Student
  - Official references for the physics potential
  - Guideline for future detector design/optimization

# Snowmass

## Topical Group Pages

- EF01: EW Physics: Higgs Boson properties and couplings
- EF02: EW Physics: Higgs Boson as a portal to new physics
- EF03: EW Physics: Heavy flavor and top quark physics
- EF04: EW Precision Physics and constraining new physics
- EF05: QCD and strong interactions: Precision QCD
- EF06: QCD and strong interactions: Hadronic structure and forward QCD
- EF07: QCD and strong interactions: Heavy Ions
- EF08 - BSM: Model specific explorations
- EF09 - BSM: More general explorations
- EF10: BSM: Dark Matter at colliders

# Benchmark & Quantification

味物理本身是极为丰富的，而不同的味物理实验设施各有特色，具有明显的比较优势。因此，标志性测量的适当选取，是明确 Higgs/Z 工厂在味物理上的物理目标、量化其物理潜力、明确其比较优势，进而量化探测器需求的前提条件。这是 CEPC 实验设计的重要前提和不可或缺的研究，可以说没有这些量化分析探测器的要求，CEPC 上的味物理仅是一纸空谈。

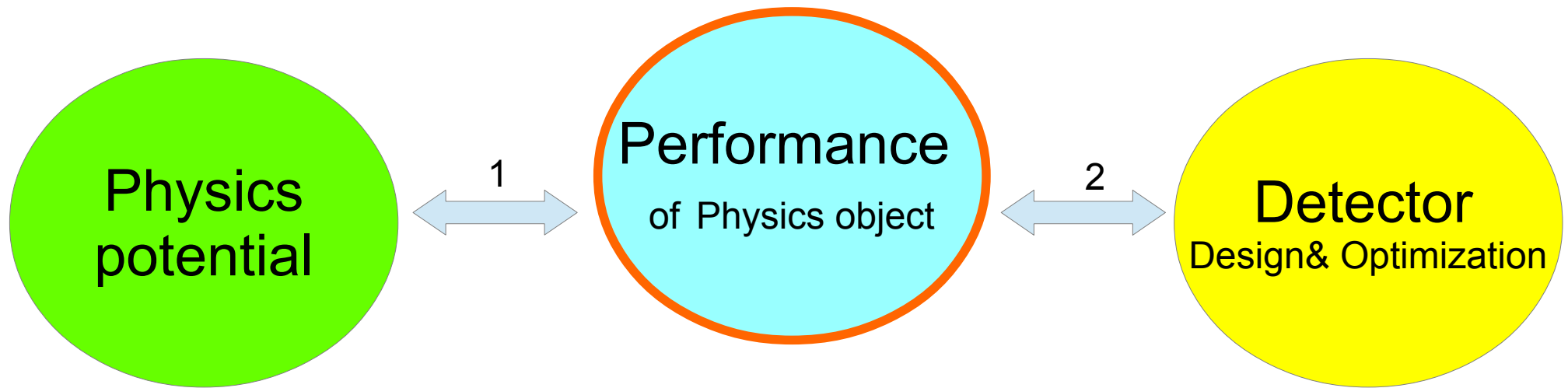
From Haibo & MQ

Valid for all CEPC Physics Potential Studies...

# Action

- Actively participate the Snowmass discussion
- Make proposals – (LoI), better benchmark based
  - Snowmass LoI before Aug. 31, 2020
  - Realistic modeling estimation with Pheno, Fast/Full Simulation at CEPC
- Accomplish the analyses at those proposal, converge to Snowmass Proceeding (July 31, 2021) & CEPC citables, which eventually become the backbone of CEPC White papers...
- The CEPC Simulation study group:
  - We are good at
    - Relative Reliable Estimation on the corresponding physics performance
    - Rough Estimation in the background, based on CDR samples – SM samples
  - Current bottleneck: man power (analysts), pheno studies (motivation & interpretation)
- Active iteration, till converge

# Bridging: Focus of the CEPC simu. group



- 1: Mostly Via Fast Simulation (Model on the performance), Validated by Full Simulation
- 2: Via Full Simulation
- CDR Baseline provides a fixed point: relative profound understanding on its performance