General Discussing on the White papers

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Objectives of this workshop

Higgs   EW   QCD   Flavor
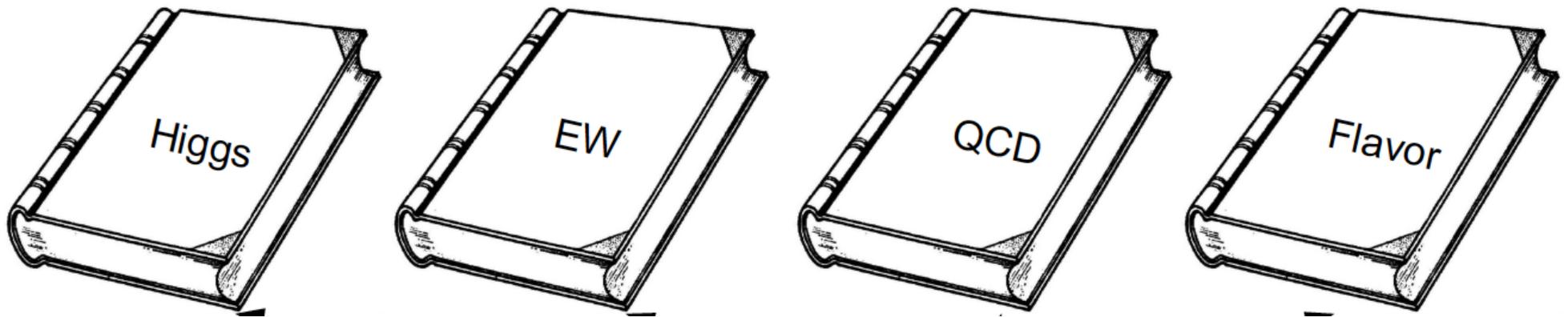
- To promote the physics study at TDR & to converge to the Physics White Papers by the end of 2020

- Physics white papers:

    – Physics handbooks for new comers: PostDoc/Student

    – Official references for the physics potential

    – Guideline for future detector design/optimization

Boundary condition

- Limited Manpower

- Tight time schedule

- Vast topics landscape

- Pathway - Benchmarks, if possible flagship benchmarks

  - Reliable modeling of the detector response, background - quantify the detector requirement

  - Clear physics meaning & impact

  - If possible: simple

Higgs

- Currently best understood

- Differential, CP
- Multi-jet final states analysis
- Control of theoretical uncertainty

EW

- Systematic controls
  - Estimation & modeling
  - Requirement on the stability of performance...
  - Requirement on the beam energy calibration & monitoring

- + Higgs: EFT

QCD

- alpha_s, and certainly a lot more than it

- Theoretical uncertainty control: major sources for many of EM measurement

- QCD Vacuum, correlations: many interesting topics by itself
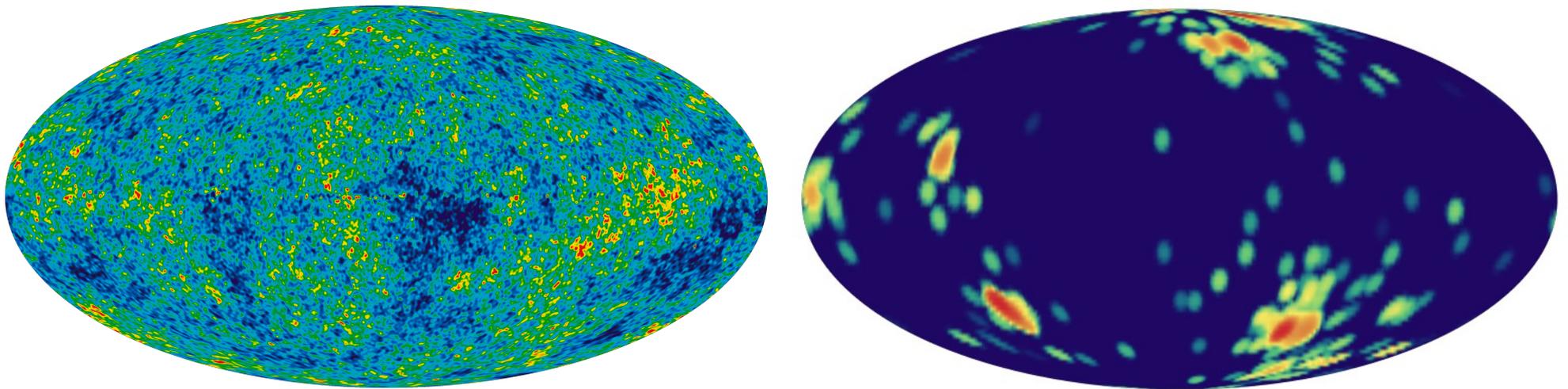
Tong-Zhi Yang (Zhejiang University)

Flavor

- Very rich physics, but also have very demanding requirements – as LHCb and B/C factories certainly are very successful experiments!

- Performance: identification of the physics objects – baryon decay products in the jet

- Requirements:

    - May emphasize on the low energy particle reconstruction...

    - Separation is certainly appreciated

Benchmarks - Higgs

- Color singlet identification: Jet Clustering-Matching, or its alternative

    – qqH, Higgs inclusive, Higgs to jets

- Differential: Jet clustering, and angular/energy measurement (Peizhu's talk)

- At different center of mass energy

- Global Fitting? (Gang)

- Detector Requirement

    – JER & Kinematic Fit's impact

    – Tracking resolution – H->mumu measurement

    – VTX: flavor tagging, secondary vertex – impact parameter reconstruction

Flavor benchmark

- Cascading – significantly control the combination background

- Neutral particle in final states: eta, pi0, photon;

- Hopefully scientifically important:

  - CP

  - Tau physics

  - Particle search

- See Sebastien, Lorenzo, Abi, Marek's talk

QCD benchmark

- Separation of events with different number of jets

- Development of color-singlet identification algorithms and study the best suited jet clustering for differential measurement?

- Alpha_s measurement:

  – The comparative advantage of CEPC

  – Different methods & comparisons

- Low energy object reconstruction... (QCD vacuum)

- Analysis of the fragmentation behaviors??

EW benchmarks

- ## Systematic controls
  - Performance calibration and controls

- ## Global interpretation:
  - + Higgs observables,
  - EFT framework and alternatives?

- ## TGC
- ## Impact analysis on beam polarization?

Many Thanks

Many synergies in between

- Higgs + EW: global EFT interpretation
- QCD to Higgs +
  - Hoping a new Jet Clustering - Matching algorithm?
  - Systematic control
- QCD and Flavor
  - Demanding on the low energy particle reconstruction...

Outlook

- Leptonic and semileptonic decays interesting to probe SM (CKM)
- As well as new physics (Lepton Flavour Universality violation)
- Prospective studies available within HL-LHC and Belle II, could also include CEPC prospects
- CEPC potential similar to Belle II for $B_{u,d,s}$, but B_c and b-baryons also present, in a cleaner environment than LHC
- Several modes potentially of interest $B_c \to \tau\nu$, $B \to \tau\nu$, $B \to \pi\tau\nu$, $b \to X\tau\nu$... and maybe others ?

Experimental studies needed
to estimate the CEPC potential on these modes