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EWP skim

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Skim

- Belle II で取得した膨大なデータを全て解析するのは非効率である。
- 解析モードの特徴にあわせてあらかじめevent を選別する事（＝skim）が重要である
  - Production の際に skim は作られるので user はフルデータの一部のみ解析するだけで良い
  - Exclusive mode : ΔE + Mbc, 中間状態のゆるい mass cut, ゆるいPID
    - 典型的な Retantion rate : a few % or less
  - Inclusive mode : photon の energy, lepton の momentum, lepton system の energy
    - 典型的な Retantion rate : several~10%
  - Skim で重要なのは signal を落とさない事と、データサイズを減らすこと
- Belle では解析グループごとにいくつかの skim を作っていた。
- Belle II でも同様に skim を行う
  - MC8 と MC9 の Y(4S) generic MC で BGなしとありのsample の skim を作る予定。

Current EWP Skim

- Sum of exclusive modes
  - B→Xsγ, Xdγ
  - B→Xsll, Xdll
  - Xs and Xd from multiple pions and/or Kaons and/or eta/omega
- Problems should be solved
  - Retention rate is high.
    - Almost no energy cut on prompt photons (gamma:loose, E>0.075GeV)
    - No PID for leptons
    - no energy cut on dilepton system
  - But tight selection applied for
    - Mbc >5.24GeV
    - Pi0:loose is not loose for high mass side. 0.124< M < 0.14 GeV(cf M_pi0^PDG =0.135GeV)
  - B→Kll and B→(π / η / η')ll is missing
  - Overlap between exclusive light mesons with different PID selections
    - Eta/omega→pipipi0 and pipipi0
  - Only for exclusive modes (sum-of-exclusive)
    - Skim for fully inclusive photon needed.

https://stash.desy.de/projects/B2/repos/software/browse/skim/EWP_List.py

https://stash.desy.de/projects/B2/repos/software/browse/analysis/scripts/stdLightMesons.py

Proposal

- Four skim modules
  - Sum of exclusive B→Xs and Xd gamma
  - Sum of exclusive B →Xs and Xd l+l- (including LFV eμ modes)
  - Inclusive gamma skim
  - Inclusive dilepton skim (including LFV eμ modes)
- Retention rates for sum of exclusive skims should be enough low
- Retention rates for inclusive skims are high but try to reduce them
  - 9.9% for gamma from HadronB at Belle
    - 1.4 < Egamma(CM) < 3.4 [GeV]
    - E9/E25 > 0.9
  - 6.2% for dilepton from HadronB at Belle
    - eid(3, -1, 5) > 0.05, E_e^{lab}> 0.395GeV
    - muid > 0.6, E_{mu}^{lab} > 0.69GeV
    - at least one opposite or same sign charged lepton pair(ee, mm, em)
      - Not only for EWP but also dilepton mixing and CPV
    - E(ll) at CM frame > 1.3GeV

まとめ

- MC8, 9 の skim が作られ、解析がしやすくなります。
  - データの skim もそのうち作られる

- 必要な skim がありましたら group convener もしくは group の skim 担当者にお願いして下さい
  - シグナルモードだけでなく、系統誤差の見積もりに必要な skim も
    - Ex. D*sample, Lambda sample, two photon sample etc.