# Brecoil Code: update and plans

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# Outline

* Code status

* To do list for SLAC workshop

# Code status

* PacHadRecoilUser and PacSemiLepRecoilUser packages almost ready for production
  - adding some fixes to make all the three $B \rightarrow K^{(*)}\nu\nu$ analyses (K against SL, $K^*$ against SL and HAD) running at the same time

* Ntuples
  - Generic MC samples (Bbbar, ccbar, qqbar, tautau) produced during Sept. production
  - Signal MC to be produced by the user

→ Every user can perform studies related to the Breco side both for HAD and SL modes in generic MC samples. In the signal side, only $K^{(*)}\nu\nu$ modes are reconstructed. To reconstruct other signal channels, some tcl and modules need to be modified.

→Needed documentation:
  - how to use the ntuples that will be available after the production : almost done in the README of the two packages
  - how to modify the code to reconstruct other signal channels?

# To do list for SLAC workshop (I)

* 6 detector configuration to be tested
  - 0: babar + SVT L0 + fw LYSO EMC
  - 1: config 0 + bwd and fwd DCH
  - 2: config 0 + bwd DCH + fwd DIRC
  - 3: config 0 + fwd DCH + bwd EMC
  - 4: config 0 + fwd DIRC + bwd EMC
  - 5: babar + SVT L0 + fw CsI & LYSO EMC + bwd EMC

* compare:
  - distribution of Btag selection variables: HAD --> $m_{ES}$, $\Delta E$, $\cos\theta_{Thrust}$
    SL --> $m_D/\Delta m$, $\cos\theta_{DL}$, $p_{lept}$
  - distribution of Bsig selection variables: $m_{K^*}$, $E_{extra}$, $E_{miss}$, $p_{miss}$
  - Btag and Btag+Bsig selection efficiency --> cut flow tables, marginal and cumulative efficiencies

for the different configurations

# To do list for SLAC workshop (II)

What we can expect from each configuration

* Config 0 (SVT L0): check if there is some variable related to vertexing (separation between primary and secondary vertexes, $\chi^2$ probability of fit vertexes..) which can help on discriminating between signal and background

* Config 1 (bwd and fwd DCH): no improvement in electron PID (table based selectors in use), gain in tracking and Btag reconstruction efficiencies, improvement in the $E_{miss}$ and $P_{miss}$ distributions due to higher coverage

* Config 2 (bwd DCH + fwd DIRC): small gain from the DCH (see below), better K-$\pi$ discrimination

# To do list for SLAC workshop (III)

What we can expect from each configuration

* Config 3 (fwd DCH + bwd EMC): higher hermeticity --> improvement in $E_{extra}$ distribution (EMC) , higher tracking efficiency (DCH), higher $\pi^0$ reconstruction efficiency

* Config 4 (fwd DIRC + bwd EMC): better K-$\pi$ discrimination, improvement in $E_{extra}$ distribution, higher $\pi^0$ reconstruction efficiency

* Config 5 (fw CsI & LYSO EMC + bwd EMC): improvement in $E_{extra}$ distribution, higher $\pi^0$ reconstruction efficiency

# Conclusion and questions

* Recoil code ready for production
* Every user can make studies on Breco, not depending on the signal mode

* Need to update documentation

* Questions:
  - Need documentation also to reconstruct other signal channels?
  - When will the production start and end?
  - Will all the 6 configuration be run?