preparation of next step detector optimisation

— from side of physics and high level reconstruction

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two necessary preparations

- clearly define physics processes and observables to benchmark the upcoming new ILD models
  - mostly done, remains assignment of analyses, not urgent
- base on state-of-the-art reconstruction and analysis tools to evaluate the physics performance hence to justify the detector performance
  - mostly still in private pools of individual developers, urgent to integrate them to a working chain and publish to next ilcsoft release

benchmark processes (ALCW15)

process	physics observables	detector performance	Ecm
H—>cc	BR	c-tag JER	any
H—>μμ	BR	high P tracking	500 GeV
H—>ττ	BR, CP	τ reconstruction, PID track separation	250 GeV
H—>bb	M_H, BR	JES, JER b-tag	500 GeV
H—>invisible Z—>qq	Higgs Portal	JER	250 GeV
eνW—>eνqq	M_W, TGC	JES, JER	500 GeV
tt-bar—>6-jet	top coupling A_{FB}	b-tag, JER jet charge	500 GeV
$\chi_1^+\chi_1^-$, $\chi_2^0\chi_1^0$ nearly degenerated	natural SUSY	low P tracking PID	500 GeV
γXX	WIMPs	Photon ER & ES Hermiticity	500 GeV

Higgs couplings, EWPO, BSM search, well covered;

still open for proposals, welcome volunteers to do the analyses

high level reconstruction tools (postDBD)

topics	benefits / improvements	developers / contracts
Si tracking	higher eff. for low-p and forward tracks	Yorgos
Particle ID	provide dE/dx, shower profile	Masakazu, Hale
GARLIC for photon rec.	higher eff. of γ rec., 2γ separation	Daniel
pi0 finder	MVA classifier + Graph matching	Graham, etc.
tau finder	TaFinder, decay modes discriminations	Taikan, Tron
vertex charge rec.	identify lost/excluded SOT tracks; recovery	Roman, etc.
flavor tagging	pi0 attachment, adaptive vertex finder	Masakazu, Taikan, etc.
jet finder	provide TurthJetFinder; valencia jet-clustering	Mikael, Marcel
BeamCal rec.	improved reconstruction algorithm	Andre
momentum covariance matrix	provide event-by-event resolution calc.	Tino
kinematic fitting	include up-to-date algorithm, including ISR	Jenny
matrix element method	implement ME calc. in Marlin	Junping, Keisuke

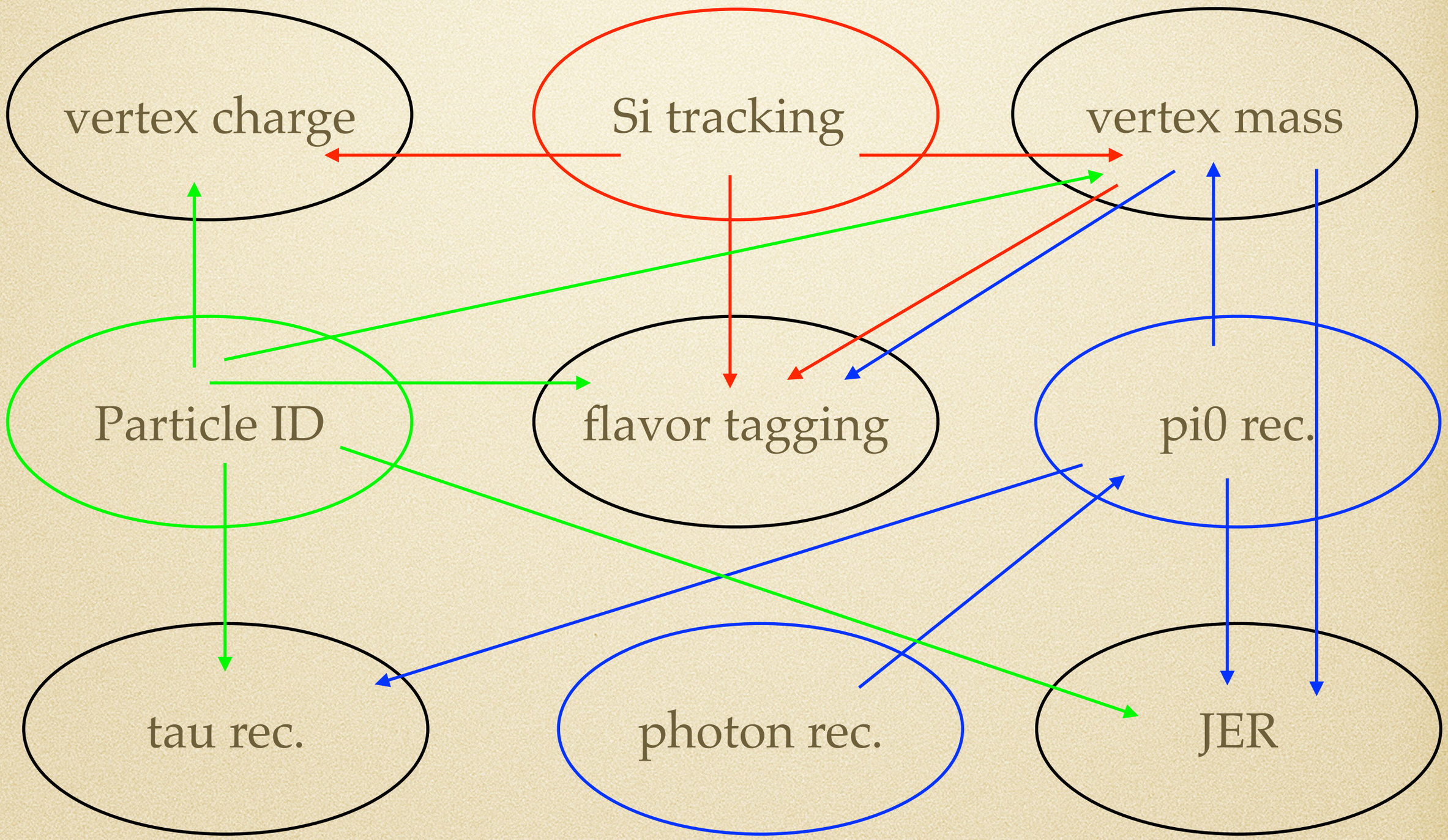
(see details in many summary talks at ALCW15)

important to integrate/release those tools

- most of those tools are developed for detector optimisation, it's a MUST to get them prepared.
- developers usually can only validate their tools partially in some aspects; release can let many users help exploit wider applications.
- foresee great merits by combining some tools (see next slide).
- some algorithms of those tools are clear and ready, but some are not yet —> release can make collaboration much easier.

merits of combining tools — examples

→ : merit flow color: category



iLCSoft since DBD

- main DBD reconstruction release: v01-16-02
- goes with ILDConfig
  - v01-16-p03: 1 TeV, with overlay
  - v01-16-p04_nobg: no overlay
  - v01-16-p05_500: 500 GeV, with overlay
  - 250 GeV, 350 GeV: overlay just changed “by hand”, no ILDConfig tag?
- since then: series of developer releases v01-17-0x, up to x=6
- includes developments (mainly) in
  - PandoraPFA (cf John’s talk)
    => open issue: JER dependence on cell size “vanished” ?!
  - VTX tracking: mini-vector based & FPCCD tracking
- no “production” release, no ILDConfig
  => behavior not well-defined without standard steering !

Re-reconstruction benefits

In addition to improvements in “high-level” tools”:

- fix pessimistic number of overlay events
- exploit improvements in low momentum tracking from mini-vector based VTX tracking
- significant changes in PandoraPFA, with potentially severe implications for calorimeter design
  (eg cell size much less important than thought at LoI times?)
- Arbor: opportunity to confirm PFA performance with independent algorithm?
- Garlic: improved photon reconstruction

possible face-to-face meeting

- gather ~10 experts on those tools, most efficient way to get all tools work in a chain and released in ilcsoft.
- run reconstruction again based on DBD simulated samples with new release.
- first ideas on workshop details:
  - location: DESY
  - date: end of June or beginning of July, e.g. (Mon-Fri):
    - June 22 - 26 (week June 29: Top WS Valencia)
    - July 6 - 10
    - July 13 - 17 (thereafter: EPS-HEP, vacations…)