

Recent commits to FastSim

Nicolas Arnaud LAL-Orsay

- Timing information for PacSimHit
- PID selectors
 - `PacPid` & `PacPidCalib` packages
- Forward PID
 - `PacForwardPid` package



Hit timing

- Timing information provided by GEANT
- Each PacSimHit has its timing set when it is added to a PacSimTrack
 - Vertex time used at track creation to initialize the track timing info
 - $\text{time}(\text{new hit}) = \text{time}(\text{previous hit}) [\text{stored in the PacSimTrack obj}] + (\text{distance between hits}) / \text{speed}$

- New member of the PacSimHit class

`double _time;`

→ taken into account in constructors

→ set by the function

```
void setTime( double time ) { _time = time; }
```

→ accessed via the function

```
double time() const { return( _time ); }
```

→ Direct use: forward PID TOF counter

PID selectors

- Two packages:
 - `PacPid` → selectors & sequences
 - `PacPidCalib` → selection of pure samples

App generating ntuples to test selector performances
- BaBar framework used
- No dependancy: core of the code copied from BaBar packages, renamed and adapted for FastSim
→ software currently runs; more cleaning/developments needed
- Example selectors written:

<code>PacPidFirstElectronSelector</code>	}	‘LH’-type selectors PID barrel (DIRC) only so far Need tuning/code improvement
<code>PacPidFirstKaonSelector</code>		
<code>PacPidFirstPionSelector</code>		
<code>PacPidTruthBasedSelector</code>		→ MC-truth based

PacPidFirst{ Kaon,Pion } Selector

- Different ‘criteria’ (veryLoose → tight) available
→ to be tuned/optimized/better coded (hardcoded ‘random’ numbers)
- Forward PID not coded (contrary to the barrel)
→ horrible kludge so far (see details in the code):
 - checks if the particle hits the forward PID detector surface
 - if so, computes a random measurement based on the particle momentum and the hardcoded expected π -K separation
→ same measurement used for the π and K selectors
→ never selects particles which aren’t true π or K
- No decent electron/muon selector yet
- No dE/dx
- Improve & implement new selectors following these examples!
→ Plan to put some ‘how to’ in the wiki documentation

PacPidTruthBasedSelector

- From Dave B.'s suggestion
- Code can in principle be used for any selector
- Based on the type of the true particle (X_{true})
- 5 probabilities of (mis-)ID $X_{\text{true}} \rightarrow Y_{\text{identified}}$ provided by user via tcl
 $Y_{\text{identified}} = \{e, \mu, \pi, K, p\}$
- Produces lists like regular selectors (use BaBar framework)
- User comments/feedbacks more than welcome

Forward PID

- Paradoxical situation:
 - simulation far from being as mature as the barrel one
 - one of the main goals of the collaboration is to decide whether such detector is needed or not→ no time to loose!
- New package (**PacForwardPid**) setup for code developments
- Very basic implementation of ‘measurement’:
 - true hit time + hardcoded error (20 ps) [not really used so far]
- Class structure implemented:
 - PacForwardPidResponse**
 - PacForwardPidMeasurement**
 - PacForwardPidReco**→ defined wherever relevant in the FastSim code

Forward PID

- Naming convention enforced: C++ & xml code
- Symbolic links should be used to go easily from one detector configuration to another [svn knows about symlinks]
- Experts of the different options need to code their detector, its response to a charged track and the measurement
- For now (for FastSim?): the active surface + a global parameterization of the whole chain is likely to be enough
→ Existing framework: 1 measure and its error
- Modified the `BtaPidQual` object (`BetaMicroAdapter` package which is now part of the simulation) to include this information

Outlook

- Quite a lot of commits to FastSim V0.0.3 yesterday
→ Sorry for the spamming... ☺
- Main goals are threefold:
 - define and clarify the code organization
 - implement structure and basic code for future developments, in particular for the forward PID detector
 - code examples which can be used to develop better/more refined algorithms (e.g. PID selectors)
- Spent more time coding than testing
- Plan is to update the wiki documentation soon
→ account requested today
- Won't have much time to code in the coming weeks

Backup slides