Status of new tracking data model
"End-user" Classes

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In short …

Driving idea:

- agree on the interfaces
- move the code adiabatically in steps
  - ➥ code always working, smooth implementation of the interfaces

Visible to the user:

- tracks & states
- propagators

To help the tracking/pattern recognition developers:

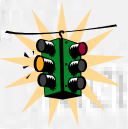
- nodes & measurements
- projectors

Details on status of implementation:
http://cern.ch/eduardo.rodrigues/lhcb/tracking/event_model/index.html

(note: place of evolving ideas/implementations …)

Working plan

1. Reach agreement on TrTrack, TrState, extrapolators interface



- GOAL: standard output of all fitting algorithms, online & offline
  - client interface: how to use the tracks, …
  - minimal interference with present code
    - ➥ e.g. leave measurements untouched at this stage
- STEPS: 1a) reach final agreement on this set of classes (today?)

  1b) implementation of converters
  - TrFitTrackToTrTrackCnv & TrgTrackToTrTrackCnv
    - ➥ needed to make sure the TrTracks work !

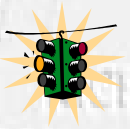
  2a) make TrFitTrack & TrgTrack inherit from TrTrack
  - at this point we could already imagine some full MC production with new model !
- TIMESCALE: 1a) end of the week

  1b) 1 week after agreement (implementation + test)

  2a) 2 weeks

Working plan

2. Reach agreement on TrMeasurement, TrNode, projectors interface



- GOAL: have some common base classes for
  pattern recognition and fitting algorithms
  - re-use as much as possible the existing code and packages
  - Tr(g)Event minimally/not touched
  - end-user/client code is unchanged !

- STEPS: 1a) get some first agreement on proposed structure
  - projectors as Gaudi tools, need for TrMeasurement & TrNode classes

  1b) re-build all necessary info from persistency

  2a) XxxClusterOnTrack replaced by TrNode,
  XxxCluster derived from TrMeasurement

  2b) pattern recognition and fitting algorithms make full use of
  projectors and new measurement classes

TrTracks (1/2)

Data members

- m_type: OK. Related enums are no problem to persistency
  - variation: make use of bitfields
- m_historyFlag: OK. Enum.
  - variation: change the name?
- m_errorFlag: renamed to m_flag . Uses bitfields with contents = { valid, … }
- m_chi2: becomes m_chi2PerDoF
  - more commonly used
- m_nDoF: keep it?
  - -> pros: fast access to info
  - variation: remove it
  - -> pros: saves space, but needs some calculations to get it back
- m_closestState: state closest to beam-line, to be persistent
  - more commonly used
  - variation: call it m_firstState
- m_states: proposal to have a SmartRefVector
  - persistency on demand: subset of states to be persistified (Beam-line, TT, T)
  - variation: use a std::map with location as key (e.g. AtTT)

TrTracks (2/2)

Public methods

- end-user methods for fast/easy access to general track information

  e.g StatusCode positionAndMomentum (double z, ITrExtrapolator *extrapolator,
  ParticleID &pid, HepPoint3D &pos, HepVector3D &mom, HepSymMatrix &cov6D)

- methods to get direct access to closest state, by z-pos or plane
  - ➥ commonly used methods in tracking code
    -> pros: friendly and simple interface
- methods with extrapolator interface as argument:

  -> pros: hide repeated operations
  (e.g. aTrack->closestState()->extrapolate())
  - ➥ variation: move these methods to the extrapolator interface
- virtual methods: # brought to a minimum
  - ➥ closestState(z/HepPlane3D), reset(), clone(), producedByAlgo()

TrStates

Data members

- m_type: enum {StraightLine, HasMomentum} Fine
- m_location: enum key for state locations (e.g. AtTT, BegRICH1, …)
- other data members: z-position, state vector, covariance

Public methods

- # of "setter" methods minimized
- methods related to position/slopes: implemented
  - no need to be virtual
- methods with Q/P or momentum: all virtual

Derived classes

- 2 strategies to derive from TrState:
  - TrStateL -> TrState (Q/P and 5 components)
  - TrStateL, TrStateP -> TrState

Tools - extrapolators

ITrExtrapolator

Public methods

- extrapolators to z and HepPlane3D

  virtual StatusCode propagate (TrState *state, double z, ParticleID partId=ParticleID(211))=0

- Issue: need for an extrapolation to some kind of surface
  - ➥ How to define a surface?

    Can use fosr the moment a typedef to HepPlane3D in a "Surface" class
- interface ITrExtrapolator defined and essentially agreed …

TrLinearExtrapolator

Public methods

- already implemented
- serves as (simple) example