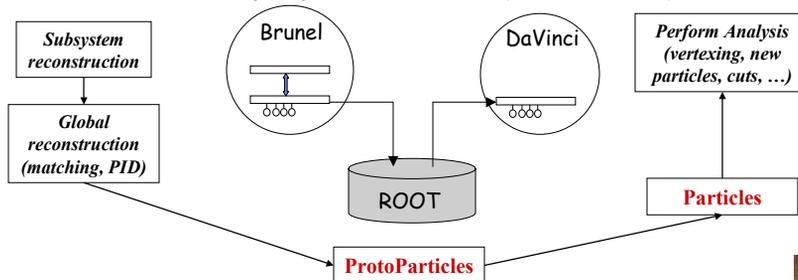**2**
Getting Started

DaVinci Package(s)

- **DaVinci is a "shell" of Gaudi like, for example, Brunel.**
  - All package and directory structure is familiar.
  - The "end-user" just programs **Algorithms** and **Tools.**
  - All "familiar" services are available
    - Job options.
    - Histograming.
    - Messaging.
    - ......
- **DaVinci takes care of data reading and package initializations that are of common use.**
- **DaVinci contains a library of tools that are of common need**
  - See next talks….

Interface with Brunel

- – **Brunel writes a OO-DST (currently a ROOT file).**
- – **DaVinci reads the OO-DST.**
    - – **It is programmed fully in C++**
    - – **It is based on the Physics Event Model (the whole LHCb Event model is available as necessary)**
    - – **Generic tools (vertexer, Kinematic Filter, etc…) are in C++**
    - ➡ "Everybody" should learn C++ (or at least a little)

Subsystem reconstruction	Brunel	DaVinci
Global reconstruction (matching, PID)		

ROOT

Particles

Perform Analysis (vertexing, new particles, cuts, …)

ProtoParticles

ProtoParticles

- • **ProtoParticles are the starting point of the Physics Analysis**
- • **ProtoParticles are the end product of the reconstruction**
    - • **They cannot be changed by the physics analysis**
- • **ProtoParticles have all the links to the reconstruction information used to produce them**
    - • **They are LHCb specific and via this link can know about all detector related information**
    - • **They are heavy and most likely a moving class**
- • **ProtoParticles have a list of valid particleID hypothesis with their probability.**
    - • **No particle ID is chosen at this point**
    - • **different analysis will want to do it differently**
- • **ProtoParticles have charge and measured kinematic information**
   - • **A specific particleID is necessary to have all the four momentum components.**

Particles and ProtoParticles

- A physics analysis does not interact "directly" with a ProtoParticle but with a Particle
    - It is possible to navigate back to the originating ProtoParticle
- A Particle has ONE chosen particle ID
- A physics analysis starting from DST files have a pre-processing stage to make Particles from ProtoParticles according to some "picking" criteria.
    - Different particles can originate from the same ProtoParticle

For ex: all pions with CL > 40% and all muons where muonID has the highest CL

e^+ π^+ μ^- μ^+

"1" "2" "3" "4"
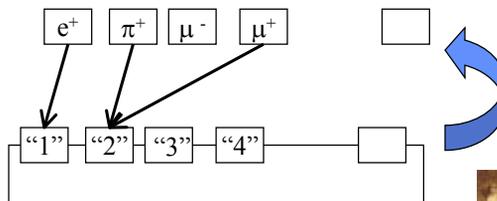
First Try

- **Get the Gaudi Package (once)**
  ```
  getpack Phys/DaVinci v6r0
  ```

  mycmt
   Phys
    DaVinci
     vXrx
      CVS
      Visual
      cmt
      doc
      job
      options
      src
       CVS
       Main

- **Go to the cmt directory**
- **Execute (always)**
  ```
  source setup.csh
  ```
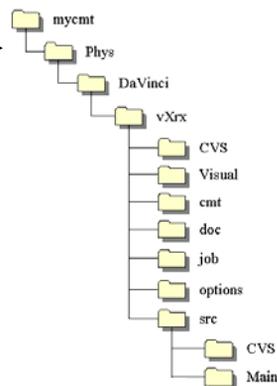- **Make the executable (once)**
  ```
  gmake
  ```
- **Go to the job directory**
- **Execute (always)**
  ```
  DaVinci.job
  ```

(the current version will run the J/Psi K0s selection algorithm)

Options File

- **Important lines in DaVinci**
  - `EventSelector.Input= ...`, which selects the input file
  - `NTupleSvc.Output= ...,` which selects the output ntuple file
  - `HistogramPersistencySvc.OutputFile= ...`, which select the output histogram file
  - `ApplicationMgr.TopAlg+= ...` lines, which configure the algorithms to run.

- **Selection cuts and other variables are steered by the corresponding algorithms**

Phys packages

DaVinci

Phys

DaVinciAssociators

FlavourTagging

DaVinciMCTools   (Check with MC truth…)

DaVinciTools   (vertexing, PhysDesktop, etc…)

DaVinciEff   (standard efficiency calculations…)

DaVinciTest

DaVinciUser   PhysSelections
(User development…)