

Reconstruction

- **Status and future of atrecon**
- **Reconstruction in each detector**
- **Combined Reconstruction Ntuple in Objy**
- **Entity list**
- **Near Future**

- **Note:**
 - **good to see new people getting involved**
 - **they all complain about documentation! We must do something about it!**

atrecon

- **Towards TDR version:**
 - **Testing (see Maya's talk on Monday)**
 - **Interfaces : update of GNUmakefile in next release (code is already in existing release)**
 - **cbntatlf: interface combined ntuple-atlfast**
 - **cbntmuid: interface combined ntuple-muon identification**
 - **atrecon+atrig**
- **Future of atrecon (Gilbert Poulard)**
 - **Atrecon will be with us until replaced by at least as good new software**
 - **Currently atrecon is a set of packages most of which are grouped in atrecon library**
 - **⇒big package induce lots of cyclic dependencies**
 - **if one want to test a package one has to link the whole library**
 - **Possible solution: one library and one or more author per atrecon package (1-2 man month work)**

Reconstruction in ID (i)

- **3D point (Rosemary Candlin)**
 - implemented in Paso
 - to be used in Graphics, iPatrec and xKalman
 - try to satisfy all “customers”
- **Progress in putting iPatrec into PASO (Hywel Phillips, working with Peter Clarke and Peter Sherwood)**
 - needed some redesigning of iPatrec “front-end” to access Event (i.e. DIGI)
 - other inputs (some geometry, B field) not looked at yet
 - a design exists but no code yet
 - Hywel, as a new comer to Atlas software, pointed to missing documentations in general, for tools as well as code
 - Happy users of Together

Reconstruction in ID (ii)

- **Other news on iPatrec:**
 - **When iPatrec in PASO, it will be able to run on whole events without external seeds**
 - **will try tracking inhomogeneous magnetic field using TrackInMagneticField (Simon Peeters)**
- **xKalman++ (Igor Gavrilenko):**
 - **entirely rewritten in C++ (except inputs (roads) and output)**
 - **non-uniform magnetic field implemented**
 - **new strategies implemented (not always starting from TRT)**
 - **CPU time: standard strategy is now 3 times faster as fortran code (B physics with pile-up), with still room for improvement**
 - **will soon go into SRT after last round of optimization**
 - **need more physics performance testing**
 - **will be adapted to new ID geometries**
 - **interface to PASO**
 - **consolidate with other tracking codes**

Reconstruction in calorimeters

- **LArg:**
 - fortran code reverse engineered (Jerome Schwindling), described in a document
 - Srinirajagopalan has started an OO design (to be run in PASO) with Jerome
 - at least first version should not go too far from atrecon structure
- **Tile:**
 - Test beam in Objectivity: more information successfully stored in Objy. Will review the whole code during winter.
 - Tile DIGI are being added to Event, so that it is available in PASO
 - Next step is to provide Cells then Energy matrices, in connection with LArg

Reconstruction in muon

- **Muonbox with CSC's (Marc Virchaux):**
 - CSC replace MDT in high rate region ($|\eta| > 2$)
 - however problem when e.m shower track accompany the muon
 - efficiency for finding good muons lower by 2-3% (w.r.t MDT) because accompanying tracks distort all the hits when for MDT only the tubes where one accompanying track is closer to the wire is affected
 - this CSC capable version of Muonbox will be made public soon
- **Other news concerning muons:**
 - GEANT4 simulated muon (with simplified digitisation) can be reconstructed with Muonbox
 - Muonbox will be wrapped into PASO
 - AMBER (pure OO/C++ code) needs maintenance to
 - port it from Windows NT to Unix
 - test/improve performances with full ATLAS events
 - COBRA (combined muon reconstruction) has been delayed due to a bug in GEANE

Combined Reconstruction in Objy

- **Maya Stavrianakou, see web page**
- **Initial Aim is to start practicing Objy on “real” events**
- **Converted Combined Ntuple in Objectivity “manually” (automatic conversion does not provide good objects)**
- **Provided several batch jobs examples**
- **Analysis tools could be practiced on it**
- **Could be used by combined performance group to start practicing on track, cluster, muon objects**
- **Volunteers are needed**

Reconstruction Entity list

- Aim is to obtain complete sketch of reconstruction by listing outputs
- Project started in September (19 direct contributors so far)
- so far, 1 to 3 iterations for each entity (Trigger still missing, will be done sometimes this week). Additional suggestions still welcome!

(ATLAS → Computing → CSG & Domains → Reconstruction → Entity)

<http://www.cern.ch/Atlas/GROUPS/SOFTWARE/OO/domains/Reconstruction/entities/entities.html>

- **Entity: list of output/input of reconstruction packages, meaningful enough to be stored:**
 - **Combined entities: electrons/gamma/muons/jets identified for $p_T=0$ to infinity**
 - **Intermediate entities: clusters/tracks/jets**
- **An entity is not a class!**
- **Semi-detailed list of “attributes” (information stored) (e.g. 3-momentum, quality variable)**
- **Semi-detailed list of “operations” (merge clusters, combine tracks) \Leftrightarrow “use cases”**

Reconstructed objects

- All reconstructed objects have some common attributes...:
 - Conditions of reconstruction (which algorithm was run with which data)
 - Journaling info (what happened during reconstruction)
 - Link to raw data/upstream data
 - (MC only) Link to corresponding MC information (true energy deposit from which MC track)
 - unambiguous label (which you can quote on the phone)
- ...and operations...:
 - Create/delete
 - Save/retrieve in persistent database
 - Visualize
 - Compare ($=\Delta R$, hits in common,...) to others
 - Redo with different input data, calibration, algorithms, algorithms parameters (maybe using truth information)
- ...which call for consistent solutions (cf AT)

Near future

- Test of PASO: all single detector reconstruction are being adapted (DIGI to be completed, HITS are desired)
- Combined Reco. groups want to get on board
- Possible solution for e/gamma, muon combined, b-tagging:
 - convert combined ntuple into flat C++ object (contact Maya S.),
 - to be used then in an analysis tool or PASO or batch job.
 - useful for analysis tool and graphics testing
- Jet/ E_{miss} need all cells without cuts \Rightarrow ntuple cannot be used:
 - simple Cell class to be written, common between LArg and Tile
 - or directly write in Objy from atrecon
- Longer term: redesign of whole software, according to **Architecture T.** recommendation
- Expect to closely interact with **Architecture T.**
- Detailed plan document to be prepared by each detector and combined perf group