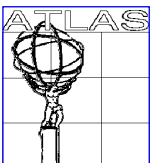


ATLAS

Muon Spectrometer Software: Overview & DICE Integration

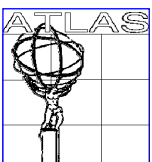
Outline:

- ✍ **History**
- ✍ **Muon software in standard ATLAS packages**
- ✍ **Other muon software**
- ✍ **MC production plans**
- ✍ **Organization**
- ✍ **Spectrometer description in DICE**
- ✍ **Summary & Outlook**



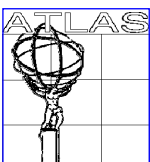
Historical remarks

- ✍ **Most applications started as stand-alone developments**
- ✍ **Good progress with integration into ‘ATLAS Software Framework’ (LHCC milestone 12/97)**
- ✍ **Most software (still) developed in Fortran 77 (+AGE ...) but notable exceptions:**
 - **Level-1 barrel trigger simulation in C, conversion to C++ envisaged (A. dell’Acqua)**
 - **OO pattern recognition for DATCHA in C++ (P. Hendriks)**



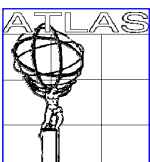
Muon Software in standard ATLAS packages (I)

- ✍ **Implementation of spectrometer in DICE (☞RV)**
- ✍ **Trigger simulation in ATRIG:**
 - **Separate LVL-1 packages reflect different detector technologies in barrel/end-cap, integration with ATRIG underway (A. dell'Acqua/Y. Hasegawa)**
 - **Common LVL-2 package developed in ATRIG framework, expected to be ready in early '98 (Boston/Lecce/Rome)**



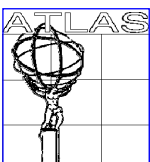
Muon Software in standard ATLAS packages (II)

- ✍ **Momentum resolution code**
(**Saclay group**) (☞ **LC**)
 - complete but fast analytic approach to momentum resolution, used for TDR performance figures
 - now integrated in ATLFAST(++)
- ✍ **Pattern recognition, track and momentum reconstruction in ATRECON**
 - **MUONBOX (Saclay group):**
Integration nearly completed
(☞ **LC**)
 - **MUONBMC (Boston group):**
standalone at present, plans for integration in ATRECON and ATRIG



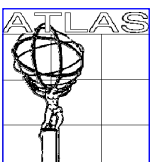
Muon Software in standard ATLAS packages (III)

- ✍ **Backtracking through calorimeters, track matching & combined reconstruction with Inner Detector**
 - **MUONFIT: complete solution for combined fit incl. covariance matrix, developed by Nijmegen group (F. Crijns), ready only later in '98**
 - **'Fast' approach developed by G. Stavropoulos/CERN**



Other Muon Software

- ✍ **Muon database (AMDB_SIMREC):**
Dimensions & positions of all muon detectors (Saclay group) (☞ LC)
- ✍ **Magnetic field map (BMAGATLAS)**
(Saclay group) (☞ LC)
- ✍ **3-D visualisation of muon spectrometer (PERSINT):**
 - **integrated with AMDB_SIMREC**
 - **allows to detect overlapping volumes (layout clashes)**
 - **can display reconstructed hits + tracks in 3-D****(Saclay group)**
- ✍ **OO pattern recognition (DATCHA)**
in ARVE framework (☞ PH)



MC production plans

Muon community plans to participate in 'massive' MC production effort:

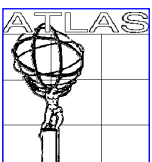
✍ Priority channels:

- single muon 'scans' (performance studies)
- $H \rightarrow ZZ^* \rightarrow 4\mu$
- $H \rightarrow t\bar{t}$
- $W' \rightarrow \mu\nu$

✍ Candidate institutes (t.b.c.):

- CERN
- BNL
- Boston
- Rome
- Munich (MPI)
-?

✍ Layout M in DICE on critical path



Organization

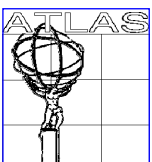
✍ Principal centers of S/W development:

- Boston
- CERN
- Nijmegen
- Rome, Lecce, Pavia, ...
- Saclay

More manpower badly needed!

✍ Coordination:

- **Physics: F. Paige (BNL)**
- **Performance simulation:**
A. Nisati (Rome) (also coordinates muon trigger code in ATRIG)
- **S/W tools, ACOS representation:**
R. Voss (CERN)



Muon spectrometer description in DICE

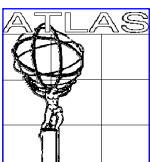
(A. Dell'Acqua/S. Baranov)

✍ **Status: implementation of geometry and materials ('Volumes') of toroid magnet structures and of**

- **RPC**
- **TGC**
- **MDT**

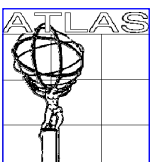
chamber sub-systems completed.

For CSCs, digitisation code is ready but geometry will be implemented with chamber layout M only.



✍ **To do:**

- **Resolve incompatibility between volume numbering schemes of AMDB_SIMREC and AGE.**
Patch is available but needs consolidation and more testing.
- **Implementation of stochastic (resolution, efficiencies, misalignments etc.) and systematic (Lorentz angles, propagation time of signals along the wires, r-t calibration, etc.) effects in the DICE/GEANT digitisation.**
- **Implement latest version of chamber geometry and layout (AMDB_SIMREC version M)**
- **Superimpose background hits (FLUKA)**



Summary & Outlook

- ✍ **Muon spectrometer software developed by (too) small but dedicated community, covers most basic needs**
- ✍ **Integration of muon software in general ATLAS packages has made good progress and is largely completed (LHCC milestone)**
- ✍ **Plan to participate in MC production, implementation of recent layout on critical path (fall-back solution available)**
- ✍ **Set up PBS-type 'master plan' for muon software development**

