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MUON SOFTWARE: STATUS AND PLANS

- PARTICIPATING INSTITUTES
- REVIEW OF FORTRAN SOFTWARE
- TEST OF Brunel v1
- MIGRATION TO C++
- UPDATE ON MUONDIGITIZER ALGORITHM

GROUPS WORKING ON MUON SOFTWARE

So far: CERN

Marseille

Rio de Janeiro

Rome I

Future: Strengthening of existing groups

New groups joining (Florence, Frascati, others?)

=> 10-15 people

Brunel TEAM

- KH willing and available (at least while at CERN)
- Central forum for discussion a good idea,
  but should also try to involve people not at CERN

REVIEW OF FORTRAN SOFTWARE

Current situation is as follows:

SICBMC v232:

- **Each of the five muon stations consists of two detector modules**
- **Geometrically, a module is modelled as a single block (hole for beam pipe) with detection area in range $7.7 \times 6.4\ m^2$ to $11.9 \times 9.9\ m^2$**

SICBDST v233r2:

- **Detector has ideal performance**
- **Hits are mapped onto (logical) readout channels**
- **Simulate trigger algorithm without considering hardware involved**

=> Released software has allowed trigger optimization, but more realistic simulation needed for TDR preparation

Work started about six months ago (Rio and Rome I)

to provide for:

- **Detailed description of detector geometry**
  (hundreds of chambers per station)
- **Detection inefficiences**
- **Crosstalk**
- **Electronic noise**
- **Deadtime**
- **Time-spread effects**
  (particle time of flight, jitter of chambers, clock delay)
- **Treatment of different detector technologies**
  (WPC, CPC, RPC)

Work well advanced, but expected to continue until

end of September

=> Fortran work has priority for next 3 months
(essential for TDR)
but C++ development should proceed in parallel

TEST OF Brunel v1

Muon group works with:

- **Standard RAWH events**
- **RAWH events stripped of banks not used by muon detector/trigger**

Checking routines of P. Colrain run on both types of event

Look at:

- **Numbers and distributions of raw/digitized hits in each station**
- **Trigger acceptance as function of P_T cut**

Results with Brunel v1 and with SICBDST v233r2 are identical

MIGRATION TO C++

Outline of plans (G. Corti) available on web:

http://lhcb.cern.ch/muon/html/OOTasks.html

Basic tasks identified, indicated timescale possibly optimistic

Detector description

XML description equivalent to description in

$LHCBSOFT/dbase/v227/cdf/mu*.cdf has been written

(M. Gandelman)

Digitization

Details of digitization algorithm in framework of Gaudi v3

and using .cdf files given by P. Colrain (November 1999)

Algorithm now modified to work with Gaudi v4 and XML files

=> see slides from M. Gandelman

Not quite equivalent to digitization in SICBDST v233r2,

as pads are used everywhere

Dropping treatment of strips in SICBDST,

Fortran and C++ give same result

Trigger

Algorithmic trigger simulation of SICBDST to be replaced by full hardware simulation in C++

"Reconstruction"

"Reconstruction" algorithms should convert from digitizings to space coordinates, taking into account possible chamber misalignments (no equivalent in SICBDST)

Particle identification

SICBDST uses a parameterization for muon identification

Realistic algorithm will probably be developed directly in C++

Exact strategy not yet known, but will certainly need information from track reconstruction, and should also combine with information from RICH

Rough indication of timescales

C++ digitization equivalent to current Fortran digitization should be available soon (one or two months)

Detailed digitization, equivalent to next Fortran release, can be expected in first half of 2001

Trigger, reconstruction and particle identification to arrive later

Timescales to be better defined in September