



# IFR report

# *g. cibinetto* on behalf of the IFR group

QMUL – Sep. 13-15 2011

# Outline

- Mechanics and electronics
  - Flux Return D&D and design (M. Benettoni)
  - Status of electronics and SiPM readout ASICS test (A. Cotta)
  - SiPM test in Krakow (W. Kucewicz)
- Beam test
  - The Beam Test at Fermilab: data taking and future plans (W. Baldini)
  - Beam test experience and results (G.C)
  - Prototype performance analysis (J. Wiechczynski)
  - Beam test data analysis (M. Rotondo)
- Background and TDR planning
  - Background simulation studies (V. Santoro)
  - TDR preparation (all)



# From BaBar D&D

- Massimo Benettoni visited SLAC from July 5 to 12: IFR barrel was at the beginning of dismounting.
- Visit of Federico Evangelisti 10 days later
- They got some very useful information, drawings and measurements of the flux return structure.
- The width of all the barrel gaps have been measured with a one inch bar (it could move freely except for 3 gaps.





from "Flux Return D&D and design" - M. Benettoni



#### SuperB IFR MOU and or Database

#### Need of MOU?

- Identify a list of the useful parts, tools, frames
- · Items shall be identified, coded, restored, stored, maintained
- Interventions: cleaning, painting, lubrication, repair tapped holes ...(cooling & gas feeding)
- Storing at SLAC: how long, where ...
- Access/transfer of barcode database, any other docs
- Access/transfer of photographs, pictures / sequences from webcams etc ...

#### Need of DATABASE !

- Official, accessible, reliable
- Per each "item": name, code/barcode, working drawings, CAD models, related assembly, pictures, procedures and tools for lifting, handling, assembly, calculations, non conformities, storing location, maintenance status/requirements
- Non conformities: defects, damages, large deviation from nominal dimensions/shape ...
- IFR measurement done by SLAC survey ...



from "Status of electronics" - A. Cotta



Note: the Z and the PHY layers have been separated in this picture to show them distinct

The actual implementation of the X-Y detector planes is being defined; they will probably result from the union of smaller X-Y modules

itute Nazionale I SuperB Collab. Meeting – QMUL Sep-13-2011 A.Cotta Ramusino for INFN-FE/Dip.Fisica UNIFE

### Developing a compact front end for ''BiRO'': the ''EASIROC'' ASIC

- The "EASIROC" by the OMEGA group of LAL in Orsay is being considered as a candidate ASIC suitable for the front end stage of a "binary mode" readout of the IFR detector.
- It has an individual trigger output for each of 32 channels plus 32 individual bias setting DACs and a common threshold setting DAC.



- Some preliminary test are being carried out to determine the proper operating parameters (bias and threshold) for our FBK SiPMs applied to the EASIROC (acknowledgements to Roberto Malaguti, INFN-Ferrara).
- The plan is now to apply an "EASIROC" to a "pizza box" detector prototype and to perform cosmic ray tests to determine the overall efficiency.

from "Status of electronics" - A. Cotta

from "SiPM test in Krakow" - W. Kucewicz



### The new beam test at FNAL

In July We had a second beam test at Fermilab Meson Beam Test facility



# Improvement since last beam test

- A lot of planning and developing has been done since December test in order to improve the overall quality of the results:
  - Online Detector Control finally working online, and with new feature (Rate Meter log, temperature log, Vbias automatic correction with the temperature variation)
  - Improved the DAQ program stability and logging
  - Improved setup:
    - More compact apparatus
    - Larger backward scintillators
  - New FEE feature:
    - Doubled the number of BiRO samples from 5 to 10
    - Added an additional communication port to allow ODC and DAQ to operate simultaneously





# Summary of data taking

from "The Beam Test at Fermilab" - W. Baldini



We have another week of test in October and one in February



# Data and performance

Nevertheless we took several good data (mainly at higher energies) to calibrate experimental setup and playing with our analysis tools





Raw (sandwich) detection efficiency calculated using muon events.

Performances are confirm previous results.

Efficiency for Time readout modules (not shown) are also in agreement with previous results.



### Test beam simulation





A detailed description of the beam test setup has been done to perform reliable Monte Carlo studies. Bruno Full Sim package has been used as framework.





first SuperB collaboration meeting - London Sep. 2011

from "Beam test data analysis" - M. Rotondo

# July2011-December2010: comparison



# Muon/pion discriminating variables

from "Beam test data analysis" - M. Rotondo



### from "Prototype performance analysis" - J. Wiechczynski New clustering algorithm



# Backgrounds simulation studies



Projected rates: few  $10^9$  neutrons/cm<sup>2</sup> per year of running – that is high but not dramatically.

Shielding can be placed on detector (polyethylene) and off detector (shielding walls) to mitigate the rates. Simulations and irradiation tests will be done.

first SuperB collaboration meeting - London Sep. 2011



from "Backgrounds report" – V. Santoro

# Radiation dose on FE electronics

The code to analyze the background on the FE electronics is now in place.

We are working with our electronic expert to have a complete knowledge of the impact of the background and to chose the best place for the crates.



# Summary and conclusions

- Many progresses have been done in different areas; here I showed:
  - mechanics
  - electronics
  - beam test
  - background
- We had bad luck with the July beam test but we will recover in October (hoping for good weather).
- TDR structure has been prepared; a responsible for each section has also been identify.
- Beyond the TDR: planning for detector construction has also started.

