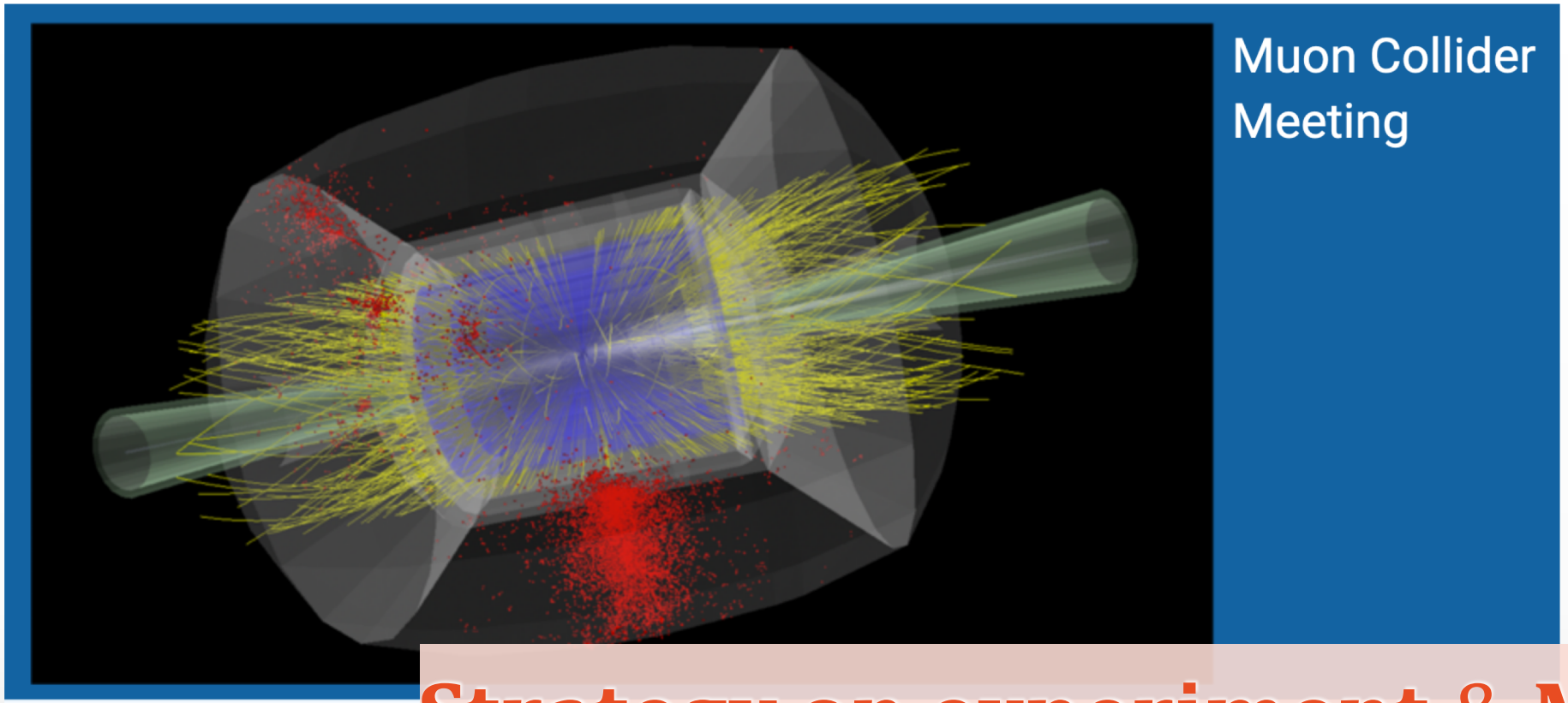


31 March 2020 to 2 April 2020
Europe/Zurich timezone

Strategy on experiment & MDI studies

Donatella Lucchesi INFN & University of Padova
for
P. Andreetto, N. Bartosik, L. Buonincontro, M. Casarsa, F. Collamati, A. Gianelle, C. Riccardi, P. Sala, P. Salvini, L. Sestini, I. Vai

Università degli Studi di Padova

INFN Istituto Nazionale di Fisica Nucleare

Detector and IR as of Today

The MAP collaboration has provided:

- Machine Detector Interface used to generate beam induced background at $\sqrt{s} = 1.5\ TeV$
- Nozzle angle optimization at $\sqrt{s} = 1.5\ TeV$
- Detector design
- The interface between detector and beam induced background
- Detector simulation
- Partial event reconstruction

Results obtained with this framework have been published

Detector and Physics Performance at a Muon Collider

Accepted for publication JINST

Lesson we learned

- Beam-induced background fluxes are very high, spatial and time distribution depend on the Interaction Region design which depends on the collider center of mass energy and luminosity

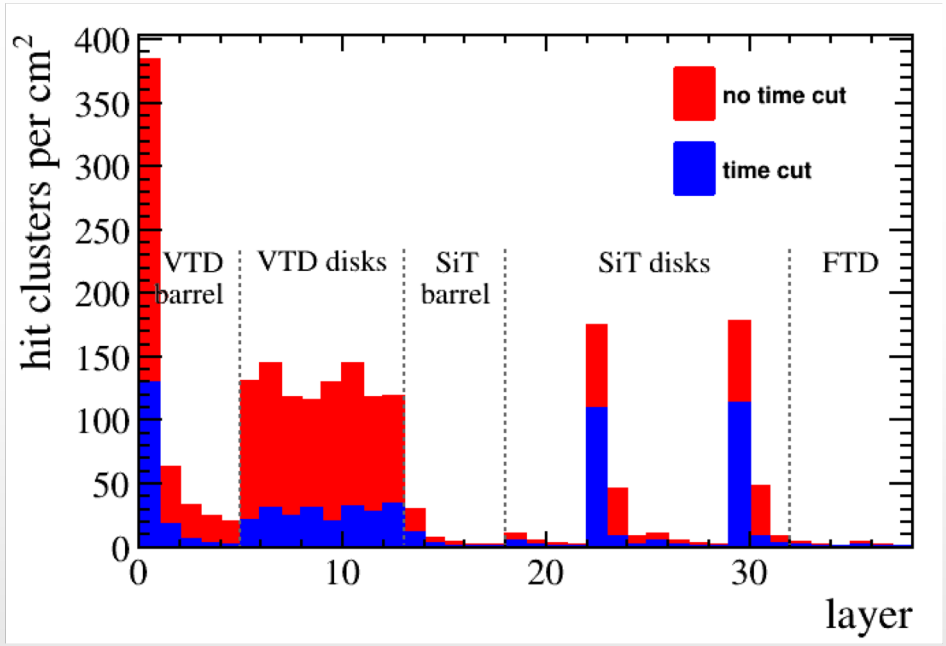
- Nevertheless, there are handles to mitigate the effects:

  5D detectors: Position, Energy and Time must be combined

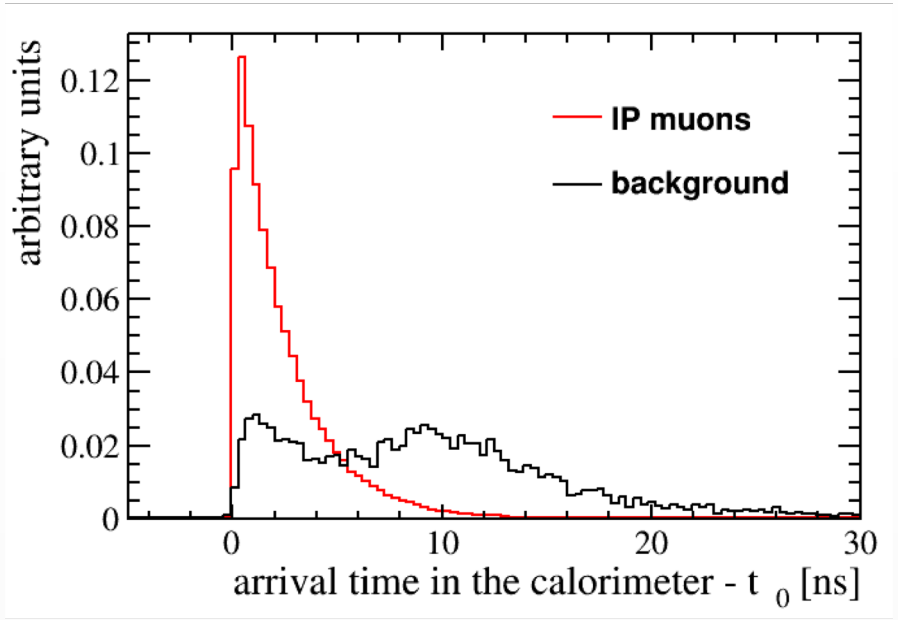
New Generation Detectors

Examples

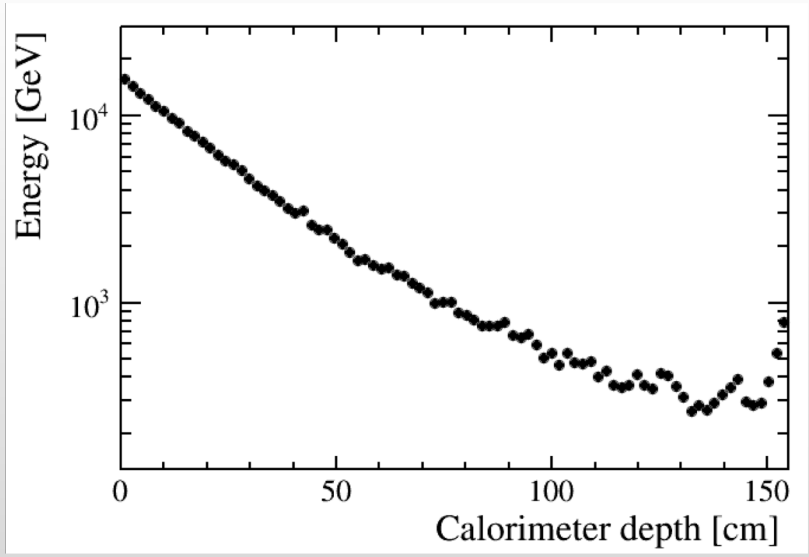
Tracking



Calorimeter



Muons



New Framework

I. Produce the Beam induced background
   - Prepare code to read the IR designed by accelerator experts
   - Simulate the beam-induced background use the detailed IR design.
     - Up to now this was done by MAP Collaboration using MARS15 code.
     - We are preparing tools based on FLUKA and LineBuilder.
     - First step: reproduce the results at $\sqrt{s} = 1.5\ TeV$
   - Very close collaboration with accelerator experts to optimize IR

II. Design a detector, simulate all the effects and reconstruct events
   - Move to the future collider framework: ILCSoftware is used with the support of CLIC people
   - Design an appropriate detector including the nozzle or other "solutions" to mitigate the beam-induced background
   - Develop event reconstruction algorithms appropriated for high energy collider

Current Status

I. Produce the Beam induced background: Small group of people is working on coding, not ready yet to present, progress have been done. F. Collamati, P. Sala, C. Curatolo

II. Design a detector, simulate all the effects and reconstruct events:
- M. Casarsa will present the status on tracking in the new framework
- N. Bartosik will show the status of the calorimeter performance in the new framework
- L. Sestini will show the first attempt to study 4 b-jets events in such a detector