Laboratoire d'Annecy-le-Vieux
de Physique des Particules

Update on the crack study - muon events analysis

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In2p3

Objective and set-up

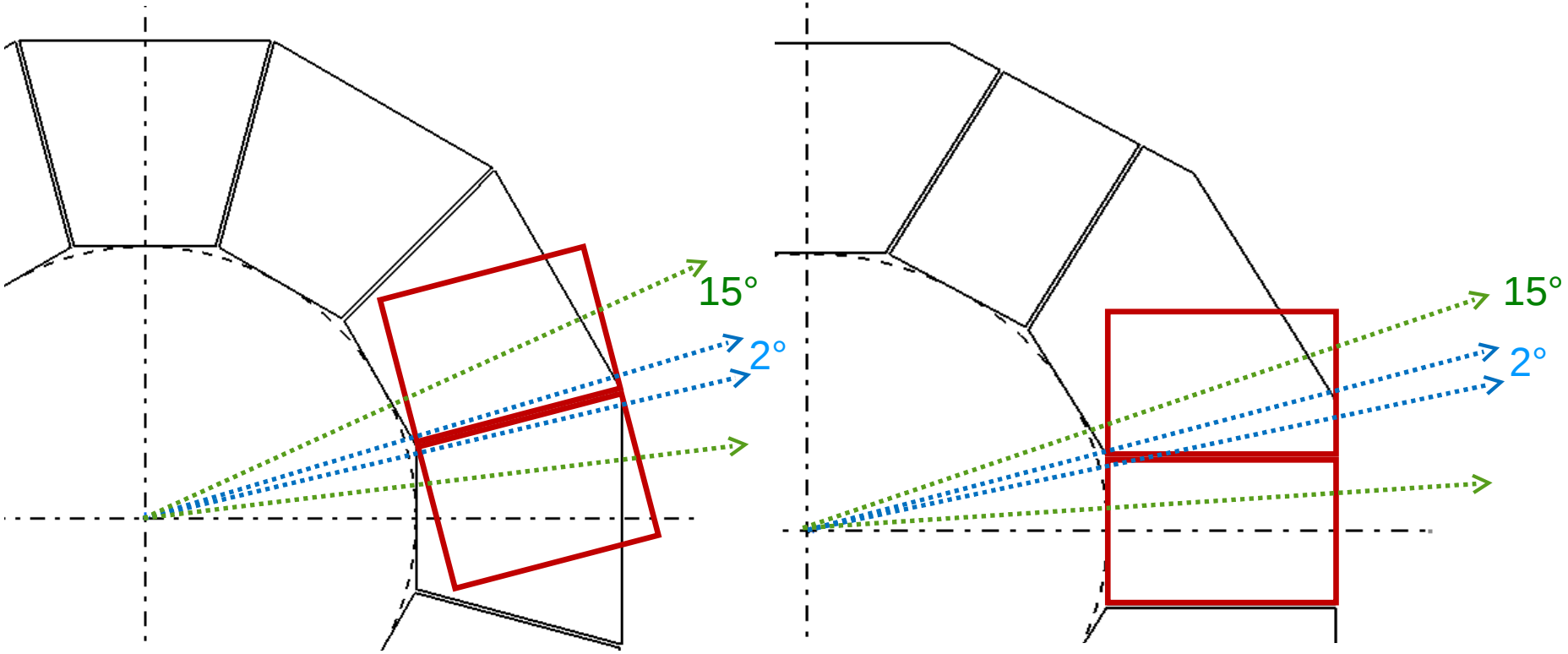
- For PFA is useful if muons can be easily identified in a calorimeter and assigned to the ones measured in muon chambers
- The aim is to estimate the fraction of muons that will be lost in a crack for the projective and non-projective geometry

- 20 kevents generated for all geometry configurations (NoFeP, 1cmFeP, 2cmFeP, and 2cmFeP_WE) for single muons of different energies (3, 10, 50, 100, 150, 200 GeV)
- Data generated for a cone angle of 15° that corresponds to an impact area of about 40 cm on a front face
- Comparison in this presentation is focused on standard configuration (2 cm thick supporting plate and a 1 cm of dead area in each module) and 50 GeV muons

Projective and non-projective geometry

Projective geometry

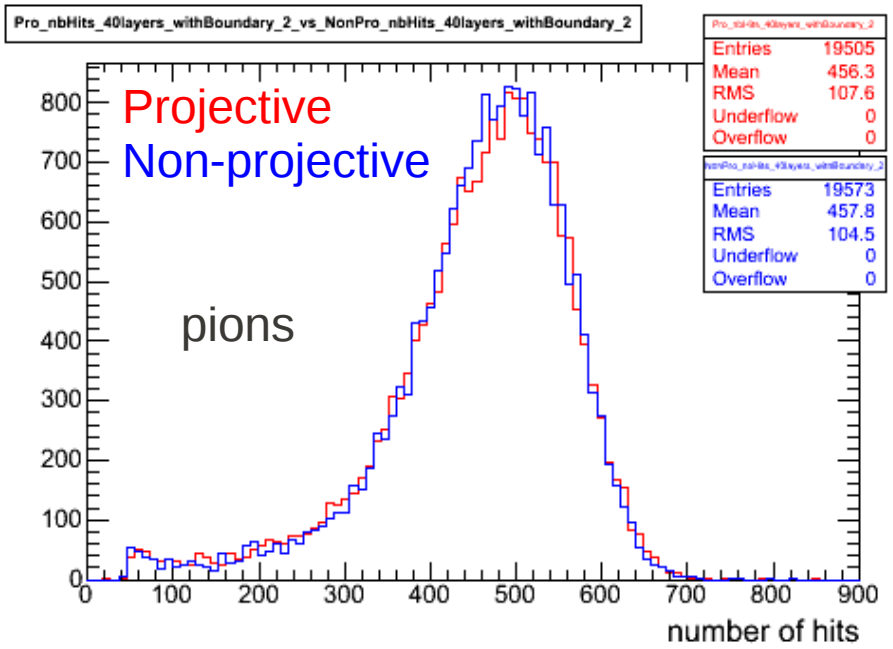
Non-projective (tilted) geometry

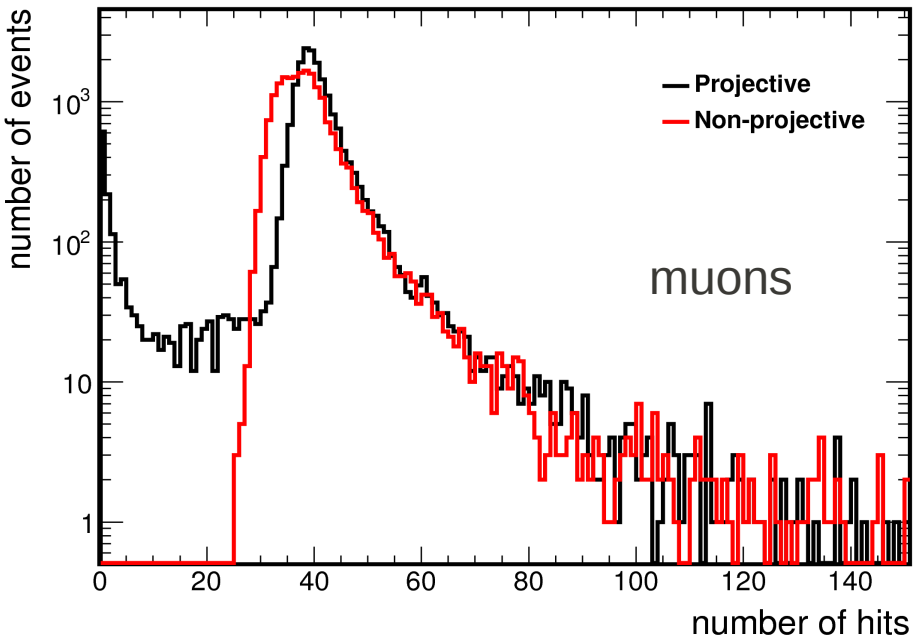


- Particles directed as they coming from the vertex
- Two data sets:
  - Small impact area: ~ 5 cm diameter around the boundary at front of the detector (a cone angle of 2°) → effects on cracks
  - Large impact area: ~ 40 cm diameter around the boundary at front of the detector (a cone angle of 15°) → effects on large phi

Pions versus muons

2 cm Fe plate between modules, 50 GeV pions





Pions: - For the large cone angle the projective and non-projective geometry show same results

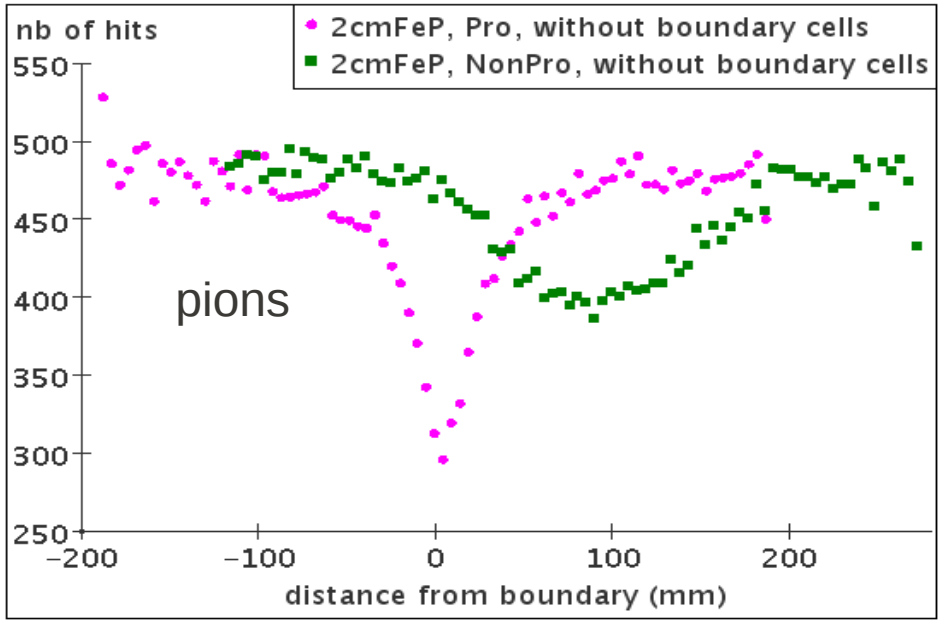
Mons: - Different distributions for the projective and non-projective geometry

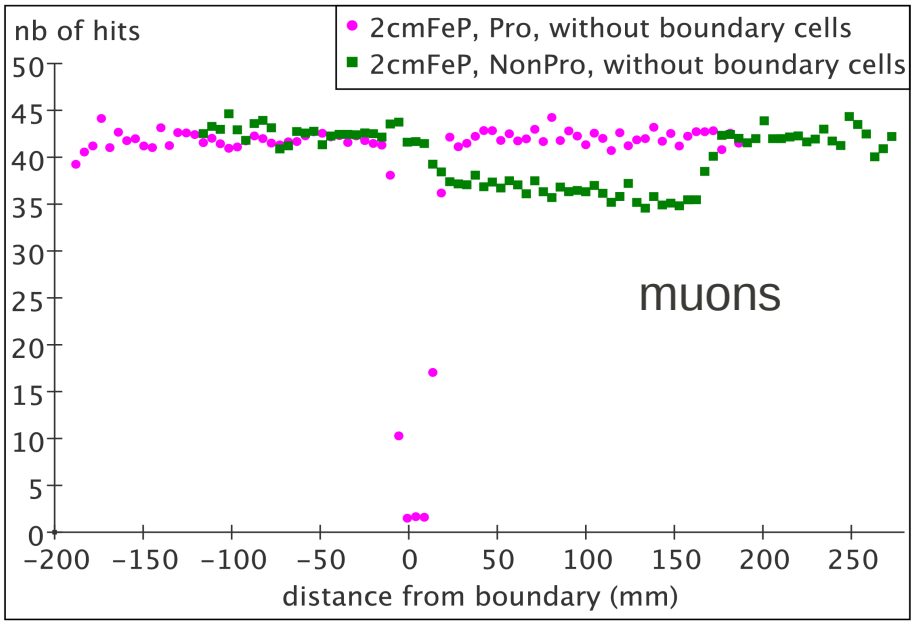
- about 5% of muons are lost in a crack in case of the projective geometry
- all muons can be easily identified in the non-projective geometry (always more than 25 hits in an event)

Pions versus muons

2 cm Fe plate between modules, 50 GeV pions

Number of hits versus distance of the impinging particle from the crack





Pions: - The projective geometry has 20% less hits around the crack in comparison with non-projective geometry

- For both geometries, the crack affects an area of around 20 cm

Mons: - Response in the projective geometry drops sharply to zero. Affected area is only several cm around the crack

- Response in the non-projective geometry decrease by 20% in a area of about 18 cm around the crack. No muon is lost in the crack.

Conclusions

Considering only muon events, the non-projective geometry is a better choice because there are no muons lost in the crack as it is in case of the projective geometry

N.B.: It is expected that the fraction of muons which are not detected due to the crack in the projective geometry will be smaller in a real detector due to the presents of the magnetic field

N.N.B: An analysis note concerning the whole crack study is ready now and will be distributed in next few days