

Nuography Project

Reconstruction group - August 2023 - BND





Muography Tracking: Idea

- Use information on the deflection of muons to determine the shape and density of objects
- Place detector above and under object of interest, tracking the muon along the way





Muography Tracking: Idea

- Several detector planes are used to measure the X and Y position of the muon track
- The Z coordinate of each plane is known













POCA: Point Of Closest Approach







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Muography Proj



- POCA: Point Of Closest Approach
 - Assume the muon only scatters once between the incoming and outgoing track
 - Caveat: if the scattering angle is too small, the method does not work
 - Apply filter to remove parallel lines





- Computing the POCA for multiple events gives you an idea of where muons are most likely to scatter
 - Use this idea to find over/ underdensities
 - Can essentially see through walls and objects!





- Computing the POCA for multiple events gives you an idea of where muons are most likely to scatter
 - Use this idea to find over/ underdensities
 - Can essentially see through walls and objects!
 - Can you guess what this object is?





Muography Project

Sometimes does not work (Thomas)

- Badly generated data
 - Too many high angles (everything > pi/2 means a muon scattered horizontally -> not possible)
 - Data might also contain electron tracks in addition to muons



Muography Project

Sometimes does not work (Thomas)

- Badly generated data
 - Too many high angles (everything > pi/2 means a muon scattered horizontally -> not possible)
 - Data might also contain electron tracks in addition to muons
 - Result: lots of noise

3D POCA points cloud





Time for some cool pictures

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Muography Project





See inside nuclear waste



Muography Project

Upgraded Italian Food (Max)





Upgraded Italian Food (Max)





Marten's ballsTM





Muography Project

Marten's ballsTM



Muography Project





Hide animals in boxes (Mohit)







Hide animals in boxes (Tomek)







Johanna's zoo









Muography Project

x [mm]



Use muography to find answers

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BSM in muography? (Anna)





Something hidden in your donut? (Adriana)





The Champion





Who's that pocamon?

3D POCA points cloud



By Marten and LizaTM









Thank you

By Hugues

