



ALICE

Title of the project

New physics searches in ultra-peripheral collisions in ALICE

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Plan

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Motivation

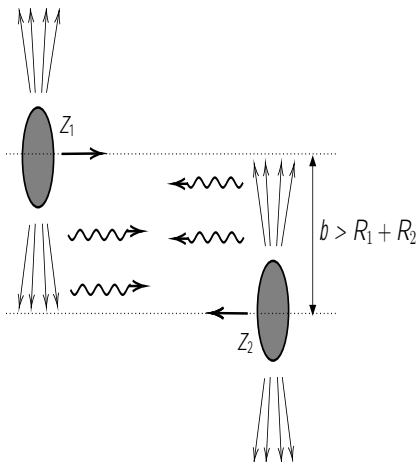
Ultra Peripheral Collisions (UPCs)

Impact parameter is larger than twice the radius of nuclei ($b > R_1 + R_2$) in UPC.

Strong interaction does not play a role

Photon induced reactions

Photon flux scales with Z^2 ($Z_{pb} = 82$)



Motivation

τ pair production

Cross section scales with Z^4

τ leptons decays quickly
and can not be observed
directly

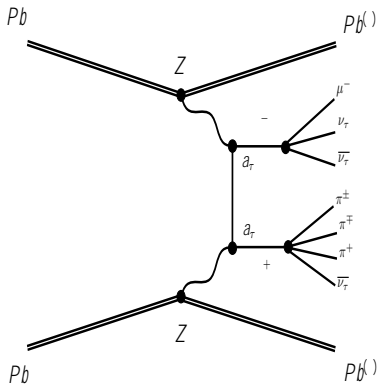
- Difficult due to at least
1 ν in each τ decay ! at
least 2 ν

Sensitive to anomalous
magnetic moment:

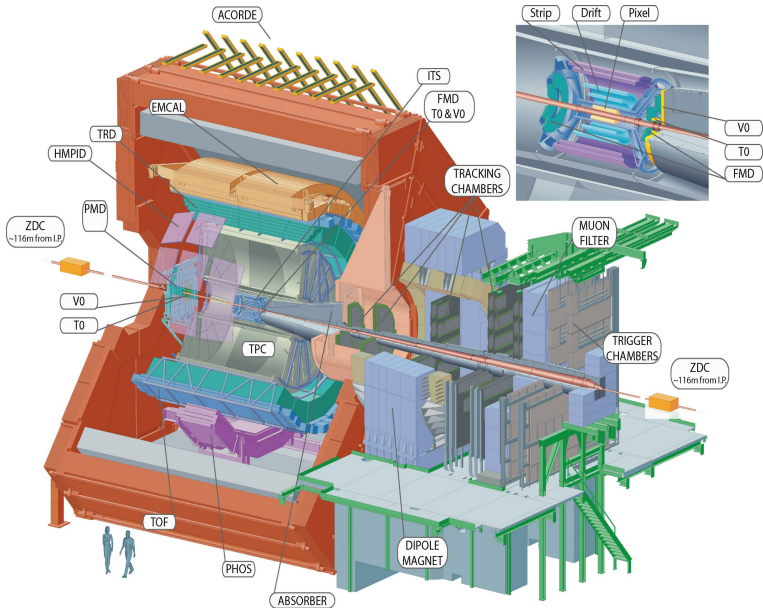
$$a_l = \frac{g_l}{2}$$

- $a_\tau^{\text{exp}} = 0.018(17)$
- $a_\tau^{\text{SM}} = 0.00117721(5)$

Cross section and tau
kinematics sensitive to a_τ



ALICE detector



Selections

UPC Triggers require certain angle between tracks found in ITS,
some information from TOF and rapidity gap

Vertex: $jVzj < 10cm + N_{vertex\ contributors} > 1$

AD offline veto ($ADA/C = 0$)

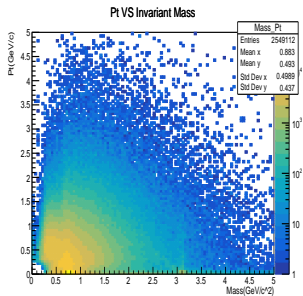
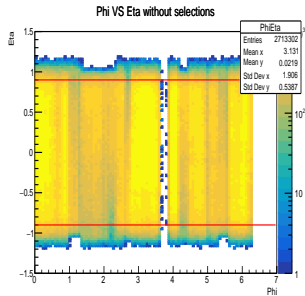
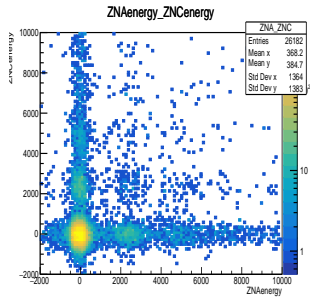
VO offline veto ($VOA/C = 0$)

No hadronic dissociation: $\sqrt{EZ_{NC}^2 + EZNA^2} < 1000\text{ GeV}$;
crosscheck with ZPA/C

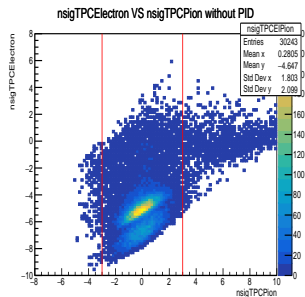
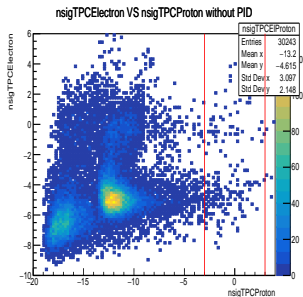
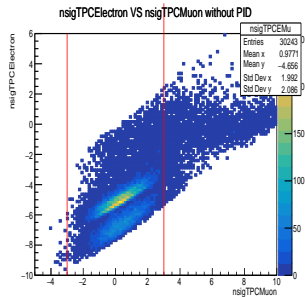
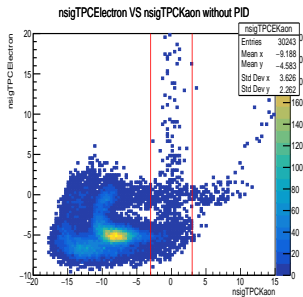
2 opposite finding TPC tracks and ITS

Veto in $M(\rho)$ region $[0.6\text{GeV}; 0.9\text{GeV}]$ and $M(J/\psi)$ region
 $[2.9\text{GeV}; 3.2\text{GeV}]$

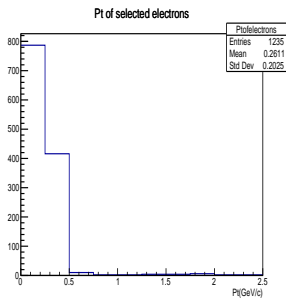
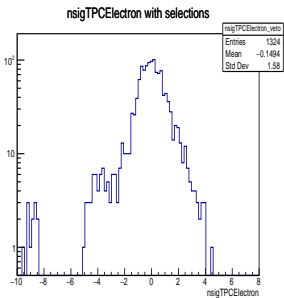
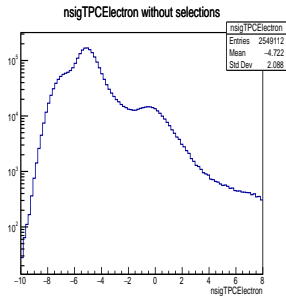
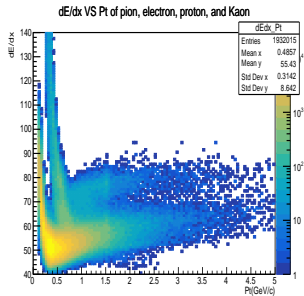
Results



Results



Results



Conclusion

What we did:

Analysing of Pb-Pb data to look for $\tau\tau$ pair production.

Using Trigger selections to isolate UPC events and study decay remnants of $\tau\tau$ pair.

Identification of the particles proton, Kaon, electron, and pion.

Perspectives:

Doing Monte Carlo simulation and compare with our results.

Need for more analysis.

Need to put better selections to differentiate particles in the Kinematic range.

Thank you for your attention.

Références

- [1] <https://alice.cern/>
- [2] https://cds.cern.ch/record/1129812/files/jinst8_08_s08002.pdf
- [3] S. Eidelman and M. Passera, Mod. Phys. Lett. A 22, 159(2007))
- [4] Burmasovet al., arXiv:2203.00990 (2022)