

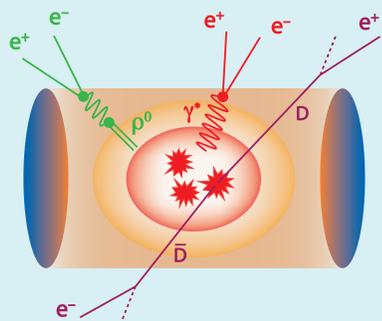
Measurement of Low-Mass Dielectron Production in Pb–Pb Collisions with ALICE

P. Reichelt¹ and A. Caliva² for the ALICE Collaboration

Motivation

Low-Mass Electron-Positron Pairs

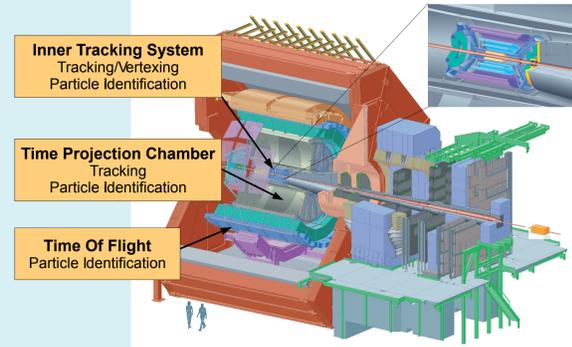
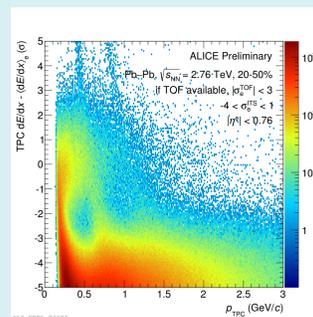
- ▶ Give access to in-medium properties of light vector mesons
- ▶ Probe the production of thermal photons in heavy-ion collisions
- ▶ Pass through the hot and dense medium almost unscathed
- ▶ Are excellent direct probes to study all collision stages



Electron Selection

The ALICE Detector

- ▶ Central barrel provides excellent tracking and PID down to low momenta

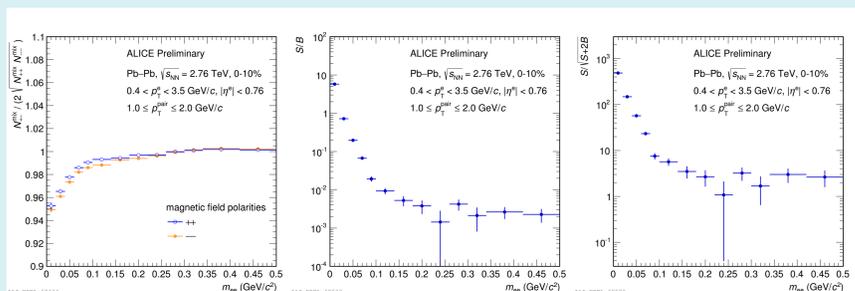


Electron Identification

- ▶ Specific energy loss in TPC after electron selection in ITS and TOF
- ▶ Selection in TPC: $-1.5 \sigma_e < dE/dx - \langle dE/dx \rangle_e < 3 \sigma_e$

e^+e^- Invariant Mass Analysis – Current Status

Central collisions (0-10 %)



R-factor
background correction from mixed event pairs, datasets for field $++/--$ analysed separately

Signal/background
requirement of good control over
- background uncertainties
- statistical fluctuations
for signal extraction above π^0 mass

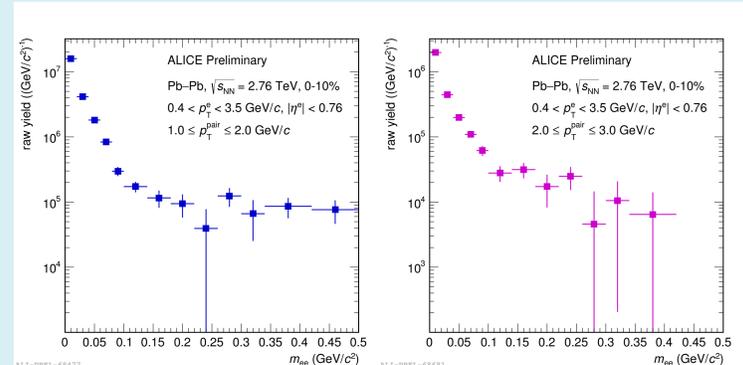
Statistical significance

Pb–Pb Collisions

at $\sqrt{s_{NN}} = 2.76$ TeV
from 2011

≈ 30 M events selected
in two centrality classes

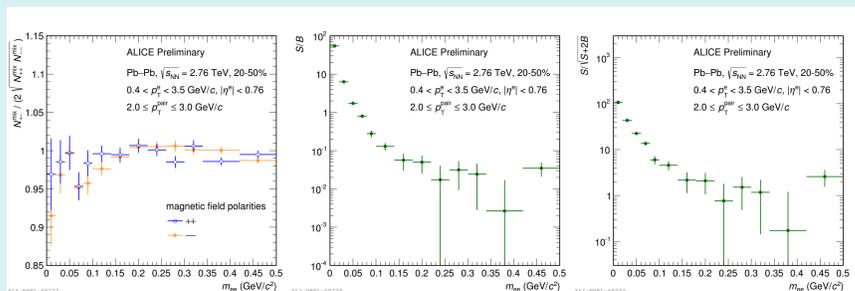
Signal extraction method:
raw yield
=
unlike-sign – R · like-sign



Background-subtracted spectra

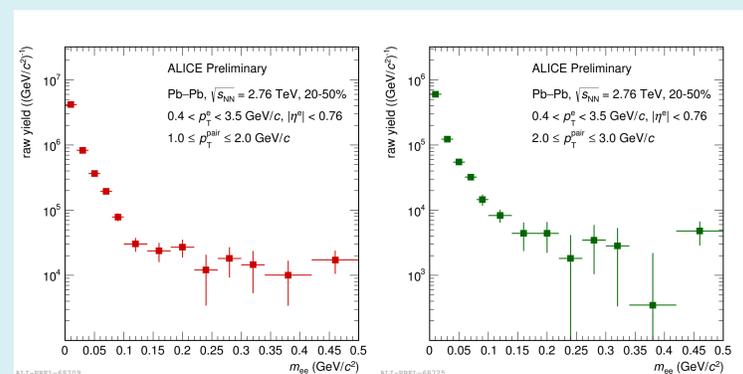
- in low invariant mass region
- for two pair- p_T ranges
- contribution from virtual direct photons expected in kinematic region of pair- $p_T > m_{ee}$

Semi-central collisions (20-50 %), different pair- p_T range



Signal cleaning:
suppression of photon conversion pairs via ϕ_V -cut up to 100 MeV/ c^2

corrections for detector efficiency yet to be applied



Monte-Carlo Studies

Study: hadron contamination, background description and signal extraction

- ▶ Validation of method for background description:
→ true background vs R · like-sign
- ▶ Effects of contamination (**eh** and **hh**) in dielectron spectrum:
→ mostly removed by background subtraction
– residual effect from correlated pairs (**hh**) can affect the signal
– max. tolerance level of hadron contamination to minimize effect: $\approx 10\%$

Conclusion: high electron purity needed for good background description and signal extraction

Summary & Outlook

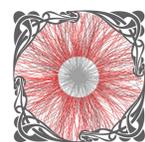
- ▶ Electron selection utilizing ITS, TPC and TOF detectors developed
- ▶ Signal of low-mass e^+e^- pairs extracted from Pb–Pb collisions at 2.76 TeV
- ▶ S/B ratio and significance challenging to further constrain results
- ▶ Systematic study between different PID and tracking strategies ongoing
- ▶ Reduction of background via conversion- and π^0 -Dalitz-rejection foreseen
- ▶ Comparison of signal and expected hadronic sources in progress



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