Contribution ID: **665** Type: **Poster**

Topological separation of dielectron signals using machine learning in Pb–Pb collisions with ALICE

Tuesday 5 September 2023 17:30 (2h 10m)

Dielectrons are an exceptional tool to study the evolution of the medium created in heavy-ion collisions. In central collisions, the energy densities are sufficient to create a quark-gluon plasma (QGP). Thermal e^+e^- pairs with invariant masses around 1.5 GeV/c^2 can be used to estimate the early average temperature of the QGP.

At LHC energies, the cross section of heavy-flavour (HF) production is large and correlated HF hadron decays dominate the dielectron yield for invariant masses above 1.1 GeV/c^2. Their contribution is modified in the medium compared to elementary collisions to an unknown extent, leading to large uncertainties in the subtraction of known hadronic sources. Alternatively, a topological separation based on the larger decay length of HF hadrons of the order of $c\tau \approx 100 - 500\ \mu$m, can be utilised to disentangle them from the contribution of thermal dielectrons originating from the primary vertex. To classify these pairs, machine learning (ML) algorithms can be applied to capture the complex multidimensional correlations in the tracking parameters.

In this poster, ML techniques to classify dielectron sources based on their decay topology with the ALICE detector will be presented for simulated Pb–Pb collisions at $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV. Their performance will be compared to the established analysis on the distance-of-closes approach (DCA) to the primary vertex. Finally, the way these ML techniques could be incorporated in future dielectron analysis will be discussed.

Category

Experiment

Collaboration (if applicable)

ALICE

Author: JUNG, Jerome (Goethe University Frankfurt (DE))

Presenter: JUNG, Jerome (Goethe University Frankfurt (DE))

Session Classification: Poster Session

Track Classification: EM Probes