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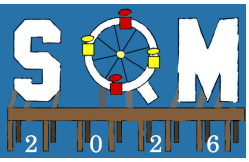

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Event-by-event net-charge fluctuations in pp, OO, Ne–Ne, and Pb–Pb collisions with ALICE at the LHC

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Investigations involving the event-by-event fluctuations of conserved quantities, like net charge, net baryon number, and strangeness in heavy-ion collisions, provide insights into the properties of QGP and the phase diagram of strongly interacting matter. Event-by-event fluctuations of net-electric charge in pp collisions at $\sqrt{s} = 13$ and 13.6 TeV and for OO, Ne–Ne, and Pb–Pb collisions at $\sqrt{s_{\rm NN}} = 5.36$ TeV are studied by analysing the data collected by the ALICE detector at CERN Large Hadron Collider.

The analysis is carried out in terms of the variable $\nu_{\rm dyn}[+,-]$, chosen for its robustness against the detector efficiency losses. The observed dependence of $\nu_{\rm dyn}[+,-]$ on the charged-particle multiplicity exhibits an energy-independent smooth increase of net-charge fluctuations from smaller to larger collision systems.

The negative values of $\nu_{\rm dyn}[+,-]$ indicate a dominance of correlations between oppositely charged particle pairs compared with those arising from like-sign charge pairs. Since $\nu_{\rm dyn}[+,-]$ is known to have an intrinsic dependence on multiplicity, an appropriate scaling is applied. The variable is therefore scaled by the factors (i) $N_{\rm ch}$ and (ii) $\frac{1}{N^{+}+N^{-}}$. The dependence of the scaled values of $\nu_{\rm dyn}[+,-]$ on particle multiplicity is also looked into.

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