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# Radial flow via $v_0(p_{\mathrm{T}})$ in heavy-ion collisions at LHC energies

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The transverse momentum dependent observable $v_0(p_{\mathrm{T}})$ has recently emerged as a novel probe of radial expansion in high-energy heavy-ion collisions. Using Pb−Pb collision data at $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV recorded with the ALICE detector, measurements of $v_0(p_{\mathrm{T}})$ for pions, kaons, and protons are performed across a broad range of collision centralities. A pseudorapidity gap technique is employed to suppress short-range nonflow correlations and isolate collective dynamics. The results reveal clear mass ordering at low $p_T$ and baryon-meson separation at higher $p_{\mathrm{T}}$, reflecting hydrodynamic expansion and hadronization via quark recombination. Comparative modeling with a blast-wave framework, including event-by-event fluctuations of radial flow velocity and freeze-out temperature, shows consistency with parameters extracted from transverse momentum spectra. Moreover, the sensitivity of $v_0(p_{\mathrm{T}})$ to bulk-viscosity effects and the underlying equation of state highlights its potential as a complementary observable for constraining the transport properties and freeze-out dynamics of the quark−gluon plasma.

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