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Azimuthal anisotropy of charged particles with transverse momentum up to 100GeV/c in PbPb collisions at root S-NN=5.02 TeV

By: [Sirunyan, AM](#) (Sirunyan, A. M.)^[2]; [Tumasyan, A](#) (Tumasyan, A.)^[2]; [Adam, W](#) (Adam, W.)^[3]; [Asilar, E](#) (Asilar, E.)^[3]; [Bergauer, T](#) (Bergauer, T.)^[3]; [Brandstetter, J](#) (Brandstetter, J.)^[3]; [Brondolin, E](#) (Brondolin, E.)^[3]; [Dragicevic, M](#) (Dragicevic, M.)^[3]; [Ero, J](#) (Ero, J.)^[3]; [Flechl, M](#) (Flechl, M.)^[3] ...[More](#)

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Abstract

The Fourier coefficients $v(2)$ and $v(3)$ characterizing the anisotropy of the azimuthal distribution of charged particles produced in PbPb collisions at root S-NN = 5.02 TeV are measured with data collected by the CMS experiment. The measurements cover a broad transverse momentum range, $1 < p(T) < 100$ GeV/c. The analysis focuses on the $p(T) > 10$ GeV/c range, where anisotropic azimuthal distributions should reflect the path-length dependence of parton energy loss in the created medium. Results are presented in several bins of PbPb collision centrality, spanning the 60% most central events. The $v(2)$ coefficient is measured with the scalar product and the multiparticle cumulant methods, which have different sensitivities to initial-state fluctuations. The values from both methods remain positive up to $p(T)$ similar to 60-80 GeV/c, in all examined centrality classes. The $v(3)$ coefficient, only measured with the scalar product method, tends to zero for $p(T)$ greater than or similar to 20 GeV/c. Comparisons between theoretical calculations and data provide new constraints on the path-length dependence of parton energy loss in heavy ion collisions and highlight the importance of the initial-state fluctuations. (C) 2017 The Author. Published by Elsevier B.V.

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Author Information

Reprint Address: [Sirunyan, AM](#) (reprint author)

+ [Yerevan Phys Inst, Yerevan, Armenia.](#)

Addresses:

- + [1] [CERN, Geneva, Switzerland](#)
- + [2] [Yerevan Phys Inst, Yerevan, Armenia](#)
- [3] [Inst Hochenergiephys, Vienna, Austria](#)
- [4] [Inst Nucl Problems, Minsk, BELARUS](#)
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