

Erratum: Constraints on the path-length dependence of jet quenching in nuclear collisions at RHIC and LHC

Barbara Betz^a and Miklos Gyulassy^{b,c,d}

^a*Institute for Theoretical Physics, Johann Wolfgang Goethe-University, 60438 Frankfurt am Main, Germany*

^b*Department of Physics, Columbia University, New York, 10027, U.S.A.*

^c*Nuclear Science Division, Lawrence Berkeley National Laboratory, Berkeley, CA, U.S.A.*

^d*Institute for Particle and Nuclear Physics, Wigner RCP, HAS, 1121 Budapest, Hungary*

E-mail: betz@th.physik.uni-frankfurt.de, gyulassy@phys.columbia.edu

ERRATUM TO: [JHEP08\(2014\)090](#)

ARXIV EPRINT: [1404.6378](#)

The figures 4 (b1) and (b2) and figures 9 (b1) and (b2) were calculated incorrectly. See replacement figures 1 and 2 below. The corrected figures imply that:

- (a) The nuclear modification factor R_{AA} at LHC energies for pure elastic energy loss [with $(a, b, c, q) = (0, 0, 2, -1)$] in the new figure 1 is now found to be compatible with both RHIC and LHC energies for $\kappa_{RHIC} = \kappa_{LHC}$. The jet v_2 -asymmetry is, however, still a factor of ~ 2 too low.
- (b) The SLTc scenario assuming a radiative jet-energy loss coupling $\kappa(T)$ that is enhanced by a factor of three in the transition range of $113 < T < 173$ MeV [23–25] does in fact describe the LHC R_{AA} -data but is sensitive to the bulk hydrodynamic background temperature field. For this $\kappa(T)$ model the RL viscous hydro field [12, 13] is preferred by both R_{AA} and v_2 .

Open Access. This article is distributed under the terms of the Creative Commons Attribution License ([CC-BY 4.0](#)), which permits any use, distribution and reproduction in any medium, provided the original author(s) and source are credited.

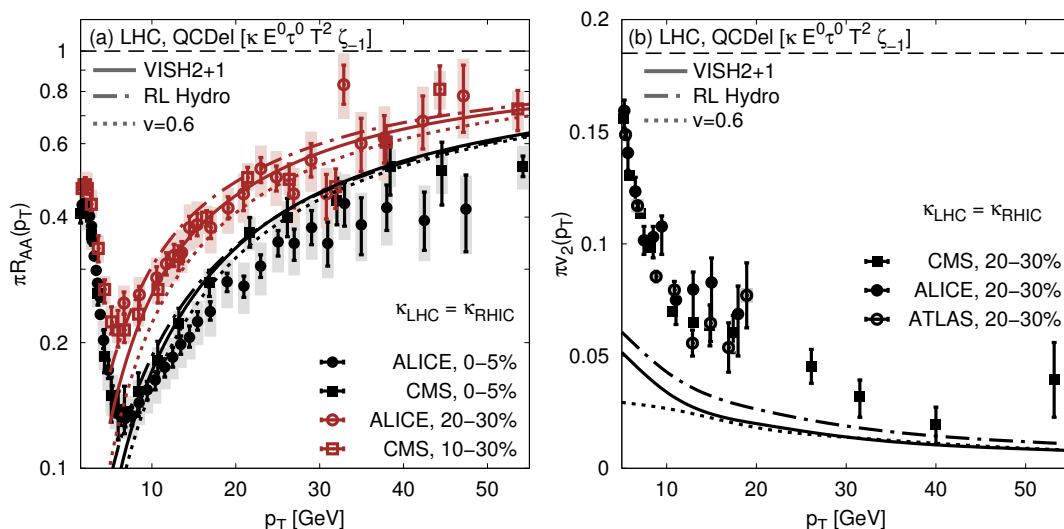


Figure 1. Corrected figure 4 (b1) and (b2) of the original publication. Panel (a) shows data for the pion nuclear modification factor R_{AA} from ALICE [17] and CMS [19], while panel (b) depicts the high- p_T elliptic flow as extracted from ALICE [18], CMS [20], and ATLAS [21, 22]. The model calculations assume elastic energy loss, $dE/dx = \kappa T^2$, with *no* energy-loss fluctuations using different bulk hydro temperature flow fields at LHC energies: viscous $\eta/s = 0.08$ VISH2+1 [9, 10] (solid), viscous $\eta/s = 0.08$ RL Hydro [12, 13] (dashed-dotted), and the $v_{\perp} = 0.6$ blast wave model [14, 15] (dotted).

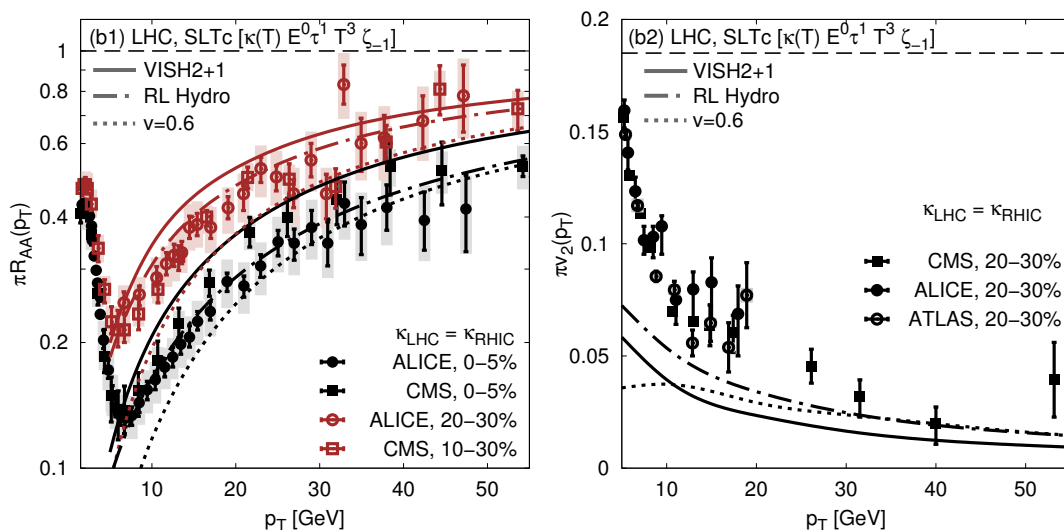


Figure 2. Corrected figure 9 (b1) and (b2) of the original publication. The pion nuclear modification factor [17, 19] and the high- p_T elliptic flow [18, 20–22] are compared to the SLTc energy loss model, $dE/dx = \kappa(T)xT^3$, with enhanced coupling near T_c [23–25], no energy-loss fluctuations, and different bulk QGP flow fields at LHC energies [9, 10, 12–15].

References

- [9] C. Shen, U. Heinz, P. Huovinen and H. Song, *Radial and elliptic flow in Pb+Pb collisions at the Large Hadron Collider from viscous hydrodynamic*, *Phys. Rev. C* **84** (2011) 044903 [[arXiv:1105.3226](#)] [[INSPIRE](#)].
- [10] Z. Qiu, C. Shen and U. Heinz, *Hydrodynamic elliptic and triangular flow in Pb-Pb collisions at $\sqrt{s} = 2.76$ TeV*, *Phys. Lett. B* **707** (2012) 151 [[arXiv:1110.3033](#)] [[INSPIRE](#)].
- [12] M. Luzum and P. Romatschke, *Conformal relativistic viscous hydrodynamics: applications to RHIC results at $\sqrt{s_{NN}} = 200$ GeV*, *Phys. Rev. C* **78** (2008) 034915 [*Erratum ibid.* **C 79** (2009) 039903] [[arXiv:0804.4015](#)] [[INSPIRE](#)].
- [13] M. Luzum and P. Romatschke, *Viscous hydrodynamic predictions for nuclear collisions at the LHC*, *Phys. Rev. Lett.* **103** (2009) 262302 [[arXiv:0901.4588](#)] [[INSPIRE](#)].
- [14] M. Gyulassy, I. Vitev, X.-N. Wang and P. Huovinen, *Transverse expansion and high p_T azimuthal asymmetry at RHIC*, *Phys. Lett. B* **526** (2002) 301 [[nucl-th/0109063](#)] [[INSPIRE](#)].
- [15] M. Gyulassy, I. Vitev and X.-N. Wang, *High p_T azimuthal asymmetry in noncentral A+A at RHIC*, *Phys. Rev. Lett.* **86** (2001) 2537 [[nucl-th/0012092](#)] [[INSPIRE](#)].
- [17] ALICE collaboration, *Centrality dependence of charged particle production at large transverse momentum in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV*, *Phys. Lett. B* **720** (2013) 52 [[arXiv:1208.2711](#)] [[INSPIRE](#)].
- [18] ALICE collaboration, *Anisotropic flow of charged hadrons, pions and (anti-)protons measured at high transverse momentum in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV*, *Phys. Lett. B* **719** (2013) 18 [[arXiv:1205.5761](#)] [[INSPIRE](#)].
- [19] CMS collaboration, *Study of high- p_T charged particle suppression in PbPb compared to pp collisions at $\sqrt{s_{NN}} = 2.76$ TeV*, *Eur. Phys. J. C* **72** (2012) 1945 [[arXiv:1202.2554](#)] [[INSPIRE](#)].
- [20] CMS collaboration, *Measurement of the azimuthal anisotropy of neutral pions in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV*, *Phys. Rev. Lett.* **110** (2013) 042301 [[arXiv:1208.2470](#)] [[INSPIRE](#)].
- [21] ATLAS collaboration, *Measurement of the azimuthal anisotropy for charged particle production in $\sqrt{s_{NN}} = 2.76$ TeV lead-lead collisions with the ATLAS detector*, *Phys. Rev. C* **86** (2012) 014907 [[arXiv:1203.3087](#)] [[INSPIRE](#)].
- [22] ATLAS collaboration, *Measurement of the pseudorapidity and transverse momentum dependence of the elliptic flow of charged particles in lead-lead collisions at $\sqrt{s_{NN}} = 2.76$ TeV with the ATLAS detector*, *Phys. Lett. B* **707** (2012) 330 [[arXiv:1108.6018](#)] [[INSPIRE](#)].
- [23] J. Liao and E. Shuryak, *Angular dependence of jet quenching indicates its strong enhancement near the QCD phase transition*, *Phys. Rev. Lett.* **102** (2009) 202302 [[arXiv:0810.4116](#)] [[INSPIRE](#)].
- [24] X. Zhang and J. Liao, *Hard probe of geometry and fluctuations in heavy ion collisions at $\sqrt{s_{NN}} = 0.2, 2.76$ and 5.5 TeV*, *Phys. Rev. C* **89** (2014) 014907 [[arXiv:1208.6361](#)] [[INSPIRE](#)].
- [25] X. Zhang and J. Liao, *Event-by-event azimuthal anisotropy of jet quenching in relativistic heavy ion collisions*, *Phys. Rev. C* **87** (2013) 044910 [[arXiv:1210.1245](#)] [[INSPIRE](#)].