# Putting RHIC & SPS J/Ψ Suppression wrt CNM on a Common Energy Density Scale

We start with the $S_{AA} = R_{AA}/R_{AA}^{CNM}$ values from Tony Frawley (RHIC) and from Roberta Arnaldi (SPS)

- these are vs centrality in terms of $N_{part}$ (PHENIX), or ZDC (SPS)
- for SPS measurements Roberta has given us the Npart for each centrality bin
- we then need to find the $dN_{charged}/d\eta$, $dE_T/d\eta$
    - for SPS Roberta has given $dN_{charged}/d\eta$ for each bin (from her plot made at Trento)
    - we use the WA98 determination of $dE_T/d\eta$ from PHENIX's PPG019 paper (*PRC 71, 034908 (2005)*), which matches the $dN_{charged}/d\eta$ that Roberta provided, to get the $dE_T/d\eta$
- for PHENIX we use the values in PPG019 and the various centrality notes (AN169 (AuAu), AN387 (CuCu)) & we correct the $dN/d\eta$ to $dN/dy$ using a factor of 1.25 (PPG019)
- the energy density is:

$$\varepsilon = \frac{dE_T/d\,y}{\tau_0 \cdot A}$$

- we get the transverse area from PPG019 (PHENIX) and from a modified version of the PHENIX Glauber Monte Carlo that is adjusted for SPS energies
- we calculate $\tau_0 * \varepsilon$, which is equivalent to energy density for $\tau_0$ = 1 fm/c
- further details below …

# PHENIX Au+Au $S_{AA}$ values from Tony Frawley

| | | AuAu | PHENIX y=0 | | dET/deta | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cent bin** | **Npart** | **dET/deta** | **dN/deta** | **area** | **/area** | **dET/dy** | **dN/dy** | **dET/dy/A** | **SAA** | **dSAA** | **sys+** | **sys-** | **cnm+** | **cnm-** |
| 0-5% | 351.4 | 606 | 687 | 140 | 4.328571 | 757.5 | 858.75 | 5.410714 | 0.491942 | 0.101439 | 0.063676 | 0.063676 | 0.100896 | 0.093942 |
| 5-10% | 299 | 493 | 560 | 125 | 3.944 | 616.25 | 700 | 4.93 | 0.627287 | 0.112912 | 0.079263 | 0.079263 | 0.125032 | 0.117111 |
| 10-15% | 253.9 | 402 | 457 | 112 | 3.589286 | 502.5 | 571.25 | 4.486607 | 0.667664 | 0.111399 | 0.082808 | 0.082808 | 0.127981 | 0.120764 |
| 15-20% | 215.3 | 328 | 372 | 100 | 3.28 | 410 | 465 | 4.1 | 0.792672 | 0.11899 | 0.097054 | 0.097054 | 0.145035 | 0.138011 |
| 20-30% | 166.6 | 241.57 | 275 | 86.6 | 2.789492 | 301.9625 | 343.75 | 3.486865 | 0.980946 | 0.114955 | 0.110509 | 0.110509 | 0.164997 | 0.159238 |
| 30-40% | 114.2 | 154.741 | 177 | 70.4 | 2.198026 | 193.4263 | 221.25 | 2.747532 | 0.93243 | 0.126396 | 0.103963 | 0.103963 | 0.1367 | 0.134749 |
| 40-60%? | 58.4 | 68.912 | 81 | 52.6 | 1.310114 | 86.14 | 101.25 | 1.637643 | 0.926241 | 0.097462 | 0.119056 | 0.119056 | 0.101585 | 0.103707 |
| 60-92.2% | 14.5 | 12.9775 | 14.7 | 32.5 | 0.399308 | 16.22188 | 18.375 | 0.499135 | 0.871586 | 0.138983 | 0.217816 | 0.217816 | 0.043338 | 0.046783 |
| | | AuAu | PHENIX y=1.7 | | dET/deta | | | | | | | | | |
| | **Npart** | **dET/deta** | **dN/deta** | **area** | **/area** | **dET/dy** | **dN/dy** | **dET/dy/A** | **SAA** | **dSAA** | **sys+** | **sys-** | **cnm+** | **cnm-** |
| 0-10% | 325.2 | 544.71 | 620 | 133 | 4.095564 | 680.8875 | 775 | 5.119455 | 0.500746 | 0.187027 | 0.10176 | 0.062739 | 0.111035 | 0.091939 |
| 10-20% | 234.6 | 364.803 | 415 | 106.9 | 3.412563 | 456.0038 | 518.75 | 4.265704 | 0.76144 | 0.117639 | 0.114983 | 0.092332 | 0.161493 | 0.135164 |
| 20-30% | 166.6 | 241.57 | 275 | 86.6 | 2.789492 | 301.9625 | 343.75 | 3.486865 | 0.753847 | 0.10059 | 0.097353 | 0.092565 | 0.142341 | 0.120819 |
| 30-40% | 114.2 | 154.741 | 177 | 70.4 | 2.198026 | 193.4263 | 221.25 | 2.747532 | 0.858149 | 0.100237 | 0.103859 | 0.103631 | 0.143241 | 0.123612 |
| 40-60%? | 58.4 | 68.912 | 81 | 52.6 | 1.310114 | 86.14 | 101.25 | 1.637643 | 1.10086 | 0.065952 | 0.160939 | 0.160939 | 0.139918 | 0.124289 |
| 60-92.2% | 14.5 | 12.9775 | 14.7 | 32.5 | 0.399308 | 16.22188 | 18.375 | 0.499135 | 0.997134 | 0.077065 | 0.281894 | 0.281894 | 0.058466 | 0.054461 |

PHENIX 200 GeV Au+Au Glauber parameters, $dE_T/d\eta$, and $dN/d\eta$

we use one energy density derived from the y=0 $dE_T/d\eta$ for PHENIX measurements at y=0 and y=1.7

TABLE XIII: Results of the measurements by PHENIX at $\sqrt{s_{NN}}$ =200 GeV. Errors have the same dimension as preceding value. Results are plotted in Figs. 5, 7 and 8.

| bin [%] | 0-5 | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 | 30-35 | 35-40 | 40-45 | 45-50 | 50-55 | 55-60 | 60-65 | 65-70 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $N_p$ | 353. | 300. | 254. | 215. | 181. | 151. | 125. | 103. | 83.3 | 66.7 | 52.5 | 40.2 | 30.2 | 22.0 |
| syst. error | 10. | 9.0 | 8.1 | 7.3 | 6.6 | 6.0 | 5.5 | 5.1 | 4.7 | 4.3 | 4.1 | 3.8 | 3.6 | 3.4 |
| $A_\perp$[fm$^2$] | 140. | 125. | 112. | 100. | 90.8 | 82.2 | 73.9 | 66.8 | 60.0 | 54.3 | 49.3 | 45.1 | 40.9 | 37.5 |
| syst. error | 11. | 10. | 9.1 | 8.2 | 7.4 | 6.8 | 6.2 | 5.7 | 5.2 | 4.8 | 4.6 | 4.5 | 4.5 | 4.9 |
| $dE_T/d\eta$ [GeV] | 606. | 493. | 402. | 328. | 266. | 216. | 173. | 137. | 107. | 81.8 | 60.4 | 43.9 | 31.1 | 21.1 |
| stat. error | 0.6 | 0.6 | 0.5 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 |
| bending syst. error | 2.4 | 5.1 | 7.0 | 7.6 | 8.2 | 8.5 | 8.2 | 8.1 | 7.6 | 6.9 | 6.4 | 5.5 | 4.6 | 3.9 |
| full syst. error | 32. | 27. | 22. | 19. | 16. | 14. | 12. | 11. | 9.5 | 8.1 | 7.2 | 5.9 | 4.9 | 4.0 |
| $\varepsilon_{Bj}\tau$ [GeV fm$^{-2}$ c$^{-1}$] | 5.4 | 4.9 | 4.5 | 4.1 | 3.7 | 3.3 | 2.9 | 2.6 | 2.2 | 1.9 | 1.5 | 1.2 | 1.0 | 0.7 |
| full syst. error | 0.6 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 |
| $dE_T/d\eta/(0.5N_p)$ [GeV] | 3.43 | 3.28 | 3.16 | 3.05 | 2.94 | 2.86 | 2.76 | 2.66 | 2.57 | 2.45 | 2.30 | 2.18 | 2.06 | 1.92 |
| bending syst. error | 0.01 | 0.03 | 0.05 | 0.07 | 0.09 | 0.12 | 0.14 | 0.17 | 0.19 | 0.22 | 0.27 | 0.31 | 0.36 | 0.43 |
| full syst. error | 0.21 | 0.20 | 0.20 | 0.20 | 0.21 | 0.22 | 0.23 | 0.25 | 0.27 | 0.29 | 0.33 | 0.36 | 0.41 | 0.47 |
| $dN_{ch}/d\eta$ | 687. | 560. | 457. | 372. | 302. | 246. | 197. | 156. | 124. | 95.3 | 70.9 | 52.2 | 37.5 | 25.6 |
| stat. error | 0.7 | 0.6 | 0.5 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 |
| bending syst. error | 25. | 17. | 14. | 11. | 10. | 9.9 | 9.4 | 9.0 | 8.2 | 7.8 | 7.1 | 6.1 | 5.2 | 4.4 |
| full syst. error | 37. | 28. | 22. | 18. | 16. | 14. | 12. | 11. | 9.6 | 8.6 | 7.6 | 6.5 | 5.4 | 4.5 |
| $dN_{ch}/d\eta/(0.5N_p)$ | 3.89 | 3.73 | 3.59 | 3.45 | 3.34 | 3.25 | 3.15 | 3.05 | 2.96 | 2.86 | 2.70 | 2.60 | 2.48 | 2.33 |
| bending syst. error | 0.14 | 0.12 | 0.11 | 0.10 | 0.12 | 0.14 | 0.16 | 0.19 | 0.21 | 0.25 | 0.30 | 0.35 | 0.41 | 0.49 |
| full syst. error | 0.23 | 0.22 | 0.21 | 0.21 | 0.21 | 0.22 | 0.24 | 0.26 | 0.28 | 0.32 | 0.36 | 0.41 | 0.46 | 0.55 |
| $E_T/N_{ch}$ [GeV] | 0.881 | 0.879 | 0.881 | 0.882 | 0.881 | 0.880 | 0.875 | 0.874 | 0.866 | 0.858 | 0.851 | 0.840 | 0.828 | 0.823 |
| bending syst. error | 0.032 | 0.026 | 0.021 | 0.017 | 0.015 | 0.012 | 0.011 | 0.010 | 0.011 | 0.013 | 0.017 | 0.023 | 0.032 | 0.047 |
| full syst. error | 0.071 | 0.069 | 0.067 | 0.066 | 0.065 | 0.065 | 0.064 | 0.064 | 0.064 | 0.064 | 0.064 | 0.065 | 0.068 | 0.076 |

# PHENIX Cu+Cu $S_{AA}$ values from Tony Frawley

| | | CuCu | PHENIX y=0 | | dET/deta | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cent bin** | **Npart** | **dET/deta** | **dN/deta** | **area** | **/area** | **dET/dy** | **dN/dy** | **dET/dy/A** | **SAA** | **dSAA** | **sys+** | **sys-** | **cnm+** | **cnm-** |
| 0-10% | 98.2 | 130 | 149.5 | 67.4 | 1.928783 | 162.5 | 186.875 | 2.410979 | 0.74447 | 0.053286 | 0.100093 | 0.100093 | 0.093211 | 0.094264 |
| 10-20% | 73.6 | 92.2 | 107.1 | 59.5 | 1.54958 | 115.25 | 133.875 | 1.936975 | 0.85883 | 0.058117 | 0.114672 | 0.114672 | 0.097977 | 0.100256 |
| 20-30% | 53 | 62 | 72.8 | 52.5 | 1.180952 | 77.5 | 91 | 1.47619 | 1.0544 | 0.068999 | 0.140003 | 0.140003 | 0.105705 | 0.109698 |
| 30-40% | 37.3 | 42 | 49.1 | 46.3 | 0.907127 | 52.5 | 61.375 | 1.133909 | 1.13379 | 0.084533 | 0.151367 | 0.151367 | 0.097364 | 0.102524 |
| 40-50% | 25.4 | 26.9 | 31.2 | 41.3 | 0.651332 | 33.625 | 39 | 0.814165 | 1.08336 | 0.102771 | 0.152125 | 0.152125 | 0.077716 | 0.082999 |
| 50-60% | 16.7 | 15.8 | 18 | 37 | 0.427027 | 19.75 | 22.5 | 0.533784 | 1.08174 | 0.122267 | 0.150331 | 0.150331 | 0.063618 | 0.068817 |
| 6-94% | 6.4 | 5.7 | 6.5 | 28.6 | 0.199301 | 7.125 | 8.125 | 0.249126 | 0.750826 | 0.095392 | 0.1178 | 0.1178 | 0.026416 | 0.029227 |
| | | CuCu | PHENIX y=1.7 | | dET/deta | | | | | | | | | |
| | **Npart** | **dET/deta** | **dN/deta** | **area** | **/area** | **dET/dy** | **dN/dy** | **dET/dy/A** | **SAA** | **dSAA** | **sys+** | **sys-** | **cnm+** | **cnm-** |
| 0-10% | 98.2 | 130 | 149.5 | 67.4 | 1.928783 | 162.5 | 186.875 | 2.410979 | 1.09961 | 0.062988 | 0.131663 | 0.131663 | 0.161906 | 0.142259 |
| 10-20% | 73.6 | 92.2 | 107.1 | 59.5 | 1.54958 | 115.25 | 133.875 | 1.936975 | 1.00297 | 0.06396 | 0.119197 | 0.119197 | 0.134656 | 0.119563 |
| 20-30% | 53 | 62 | 72.8 | 52.5 | 1.180952 | 77.5 | 91 | 1.47619 | 1.04937 | 0.065533 | 0.12409 | 0.12409 | 0.124498 | 0.111888 |
| 30-40% | 37.3 | 42 | 49.1 | 46.3 | 0.907127 | 52.5 | 61.375 | 1.133909 | 1.17075 | 0.069691 | 0.139326 | 0.139326 | 0.119595 | 0.108847 |
| 40-50% | 25.4 | 26.9 | 31.2 | 41.3 | 0.651332 | 33.625 | 39 | 0.814165 | 0.992552 | 0.069399 | 0.126097 | 0.126097 | 0.084842 | 0.078185 |
| 50-60% | 16.7 | 15.8 | 18 | 37 | 0.427027 | 19.75 | 22.5 | 0.533784 | 1.21091 | 0.084602 | 0.149607 | 0.149607 | 0.084462 | 0.078748 |
| 60-70% | 10.4 | 9.31 | 10.54 | 33.6 | 0.277083 | 11.6375 | 13.175 | 0.346354 | 1.10613 | 0.102869 | 0.130403 | 0.130403 | 0.061595 | 0.058023 |
| 70-94% | 4.7 | 4.21 | 4.76 | 27.1 | 0.155351 | 5.2625 | 5.95 | 0.194188 | 1.01422 | 0.084315 | 0.125618 | 0.125618 | 0.037552 | 0.035872 |

For Cu+Cu we use do not have the $dN/d\eta$ and $dE_T/d\eta$, so we use the Au+Au values at the same $N_{part}$.
For the Cu+Cu Transverse Areas we use the PHENIX Cu+Cu Glauber code (Raphael)

# SPS In+In and Pb+Pb $S_{AA}$ values from Roberta Arnaldi

NA60 InIn sqrt(s)=17.2

| Npart | dET/deta | dN/deta | area | dET/deta /area | SAA | dSAA | sys | cnm |
|---|---|---|---|---|---|---|---|---|
| 201.99 | 201.99 | 246.332 | 108.9 | 1.854821 | 0.99553 | 0.024502 | 0.154668 | 0.098656 |
| 187 | 184.195 | 228.062 | 102.9 | 1.790039 | 1.02744 | 0.016403 | 0.037742 | 0.101818 |
| 164 | 159.9 | 202.409 | 94.5 | 1.692063 | 0.985811 | 0.015219 | 0.014064 | 0.097693 |
| 139 | 135.525 | 178.545 | 85.5 | 1.585088 | 0.941916 | 0.015016 | 0.007908 | 0.093343 |
| 114 | 107.73 | 154.682 | 76.4 | 1.410079 | 0.936725 | 0.01533 | 0.007244 | 0.092829 |
| 90 | 82.8 | 131.773 | 67.3 | 1.230312 | 0.984587 | 0.016428 | 0.007521 | 0.097572 |
| 67 | 58.625 | 109.818 | 58.4 | 1.003853 | 0.993073 | 0.017896 | 0.00793 | 0.098413 |
| 53 | 45.315 | 96.4545 | 52.3 | 0.866444 | 1.00779 | 0.028274 | 0.008279 | 0.099871 |

NA50 PbPb sqrt(s)=17.2

| Npart | dET/deta | dN/deta | area | dET/deta /area | SAA | dSAA | sys |
|---|---|---|---|---|---|---|---|
| 43.68 | 36.036 | 87.5582 | 49.9 | 0.722164 | 0.980922 | 0.096973 | 0.080994 |
| 75.56 | 67.2484 | 117.989 | 61.4 | 1.095251 | 1.06671 | 0.089964 | 0.088077 |
| 119.44 | 113.468 | 159.875 | 76.6 | 1.481305 | 0.993887 | 0.068544 | 0.082064 |
| 169.55 | 165.3113 | 207.707 | 93 | 1.77754 | 0.987717 | 0.065124 | 0.081555 |
| 222.53 | 224.7553 | 270.523 | 110.2 | 2.039522 | 0.946961 | 0.058454 | 0.078189 |
| 276.39 | 283.2998 | 339.153 | 127.9 | 2.21501 | 0.831519 | 0.043116 | 0.068658 |
| 329.98 | 339.8794 | 407.975 | 143.9 | 2.361914 | 0.868601 | 0.051094 | 0.071719 |
| 364.75 | 377.5163 | 451.438 | 155.3 | 2.430884 | 0.747466 | 0.064997 | 0.061717 |

$N_{part}$, $dN/d\eta$, $S_{AA}$, $dS_{AA}$ and sys come directly from Roberta's plot macro from Trento

The $dE_T/d\eta$ values are interpolate from the WA98 tables in PPG019 ( nucl-ex/0409015) using the $N_{part}$ for each centrality bin

TABLE VII: Published (P) WA98 results at $\sqrt{s_{NN}}$=17.2 GeV taken from Figs.7 and 14 in reference [25] and recalculated (R) results plotted in Figs. 11, 12, 13, and 14. Additional systematic errors are shown in the plots.

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | $N_p$ | | | | | 382 | 357 | 311 | 269 | 234 | 201 | 174 | 148 | 128 | 109 | 91 | 75 | 62 | 49 | 39 |
| P | error | | | | | 11 | 9 | 7 | 7 | 6 | 5 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 2 | 11 |
| P | $dE_T/d\eta/(.5N_p)$ [GeV] | | | | | 2.09 | 2.06 | 2.06 | 2.05 | 2.03 | 2.00 | 1.95 | 1.96 | 1.93 | 1.87 | 1.84 | 1.78 | 1.73 | 1.70 | 1.59 |
| P | error [GeV] | | | | | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.11 | 0.11 | 0.11 | 0.11 | 0.12 | 0.14 | 0.15 | 0.17 | 0.18 |
| R | $dE_T/d\eta/(.5N_p)$ [GeV] | | | | | 2.00 | 1.97 | 1.97 | 1.97 | 1.95 | 1.92 | 1.88 | 1.88 | 1.85 | 1.80 | 1.76 | 1.71 | 1.67 | 1.63 | 1.53 |
| R | error [GeV] | | | | | 0.12 | 0.11 | 0.11 | 0.11 | 0.12 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.12 | 0.13 | 0.15 | 0.17 | 0.18 |
| P | $N_p$ | 381 | 355 | 310 | 268 | 231 | 199 | 171 | 145 | 124 | 105 | 87 | 72 | 58 | 46 | 36 | 27 | 20 | 13 | 9 |
| P | error | 10 | 9 | 8 | 7 | 6 | 6 | 6 | 5 | 5 | 5 | 4 | 5 | 4 | 3 | 3 | 3 | 2 | 2 | 12 |
| P | $dN_{ch}/d\eta/(.5N_p)$ | 2.66 | 2.64 | 2.62 | 2.60 | 2.58 | 2.54 | 2.50 | 2.49 | 2.43 | 2.40 | 2.34 | 2.32 | 2.31 | 2.29 | 2.20 | 2.17 | 2.13 | 2.17 | 2.22 |
| P | error | 0.09 | 0.09 | 0.10 | 0.10 | 0.10 | 0.10 | 0.11 | 0.11 | 0.11 | 0.12 | 0.14 | 0.17 | 0.19 | 0.21 | 0.23 | 0.25 | 0.26 | 0.29 | 0.31 |
| R | $dN_{ch}/d\eta/(.5N_p)$ | 2.13 | 2.11 | 2.10 | 2.08 | 2.07 | 2.03 | 2.00 | 2.00 | 1.94 | 1.92 | 1.88 | 1.85 | 1.85 | 1.83 | 1.76 | 1.74 | 1.71 | 1.74 | 1.78 |
| R | error | 0.07 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.09 | 0.09 | 0.09 | 0.10 | 0.12 | 0.14 | 0.16 | 0.16 | 0.18 | 0.20 | 0.21 | 0.23 | 0.25 |
| P | $N_p$ | | | | 383 | 359 | 315 | 276 | 242 | 211 | 185 | 160 | 140 | 123 | 106 | 91 | 78 | 66 | 56 | 49 |
| P | error | | | | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 4 | 3 | 4 | 6 | 6 | 6 | 5 | 5 | 11 |
| P | $E_T/N_{ch}$ [GeV] | | | | 0.78 | 0.78 | 0.79 | 0.80 | 0.80 | 0.81 | 0.79 | 0.79 | 0.81 | 0.81 | 0.81 | 0.80 | 0.79 | 0.78 | 0.77 | 0.77 |
| P | error [GeV] | | | | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| R | $E_T/N_{ch}$ [GeV] | | | | 0.94 | 0.94 | 0.95 | 0.96 | 0.96 | 0.97 | 0.95 | 0.95 | 1.00 | 0.98 | 0.97 | 0.96 | 0.94 | 0.94 | 0.93 | 0.93 |
| R | error [GeV] | | | | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 |

The transverse areas for the SPS are calculated using a modified copy of the PHENIX Glauber Monte Carlo (by Raphael), using the following:

- $\sigma_{pp}$ = 32 mb
- for Pb+Pb: A=207, Z=82, R=6.624, diffuseness = 0.549
- for In+In: A=115, Z=49, R=5.357, diffuseness = 0.563

and by adjusting centrality bin boundaries to obtain Roberta's Npart values

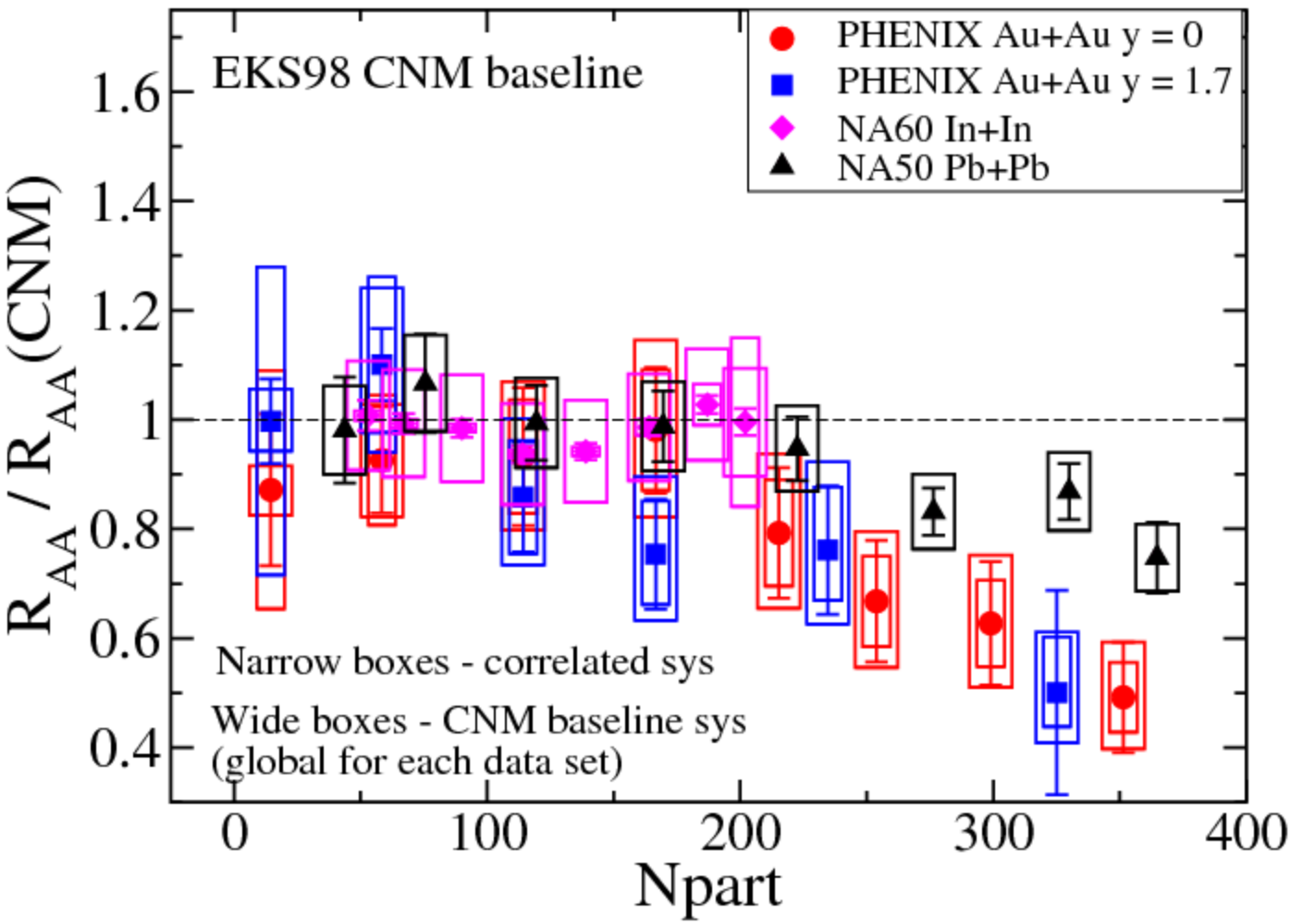
Pb+Pb: Binning = {4.,6.,14.,19.,30.,37.,52.,60.}
Npart = {365.4,328.5,277.7,222.2,168.7,119.8,76.6,44.5}
Area = {155.3,143.9,127.9,110.2,93.0,76.6,61.4,49.9}

I also give you the b values, which are close to the published ones
Impact = {2,3.37,4.73,6.1,7.42,8.7,10.03,11.46}

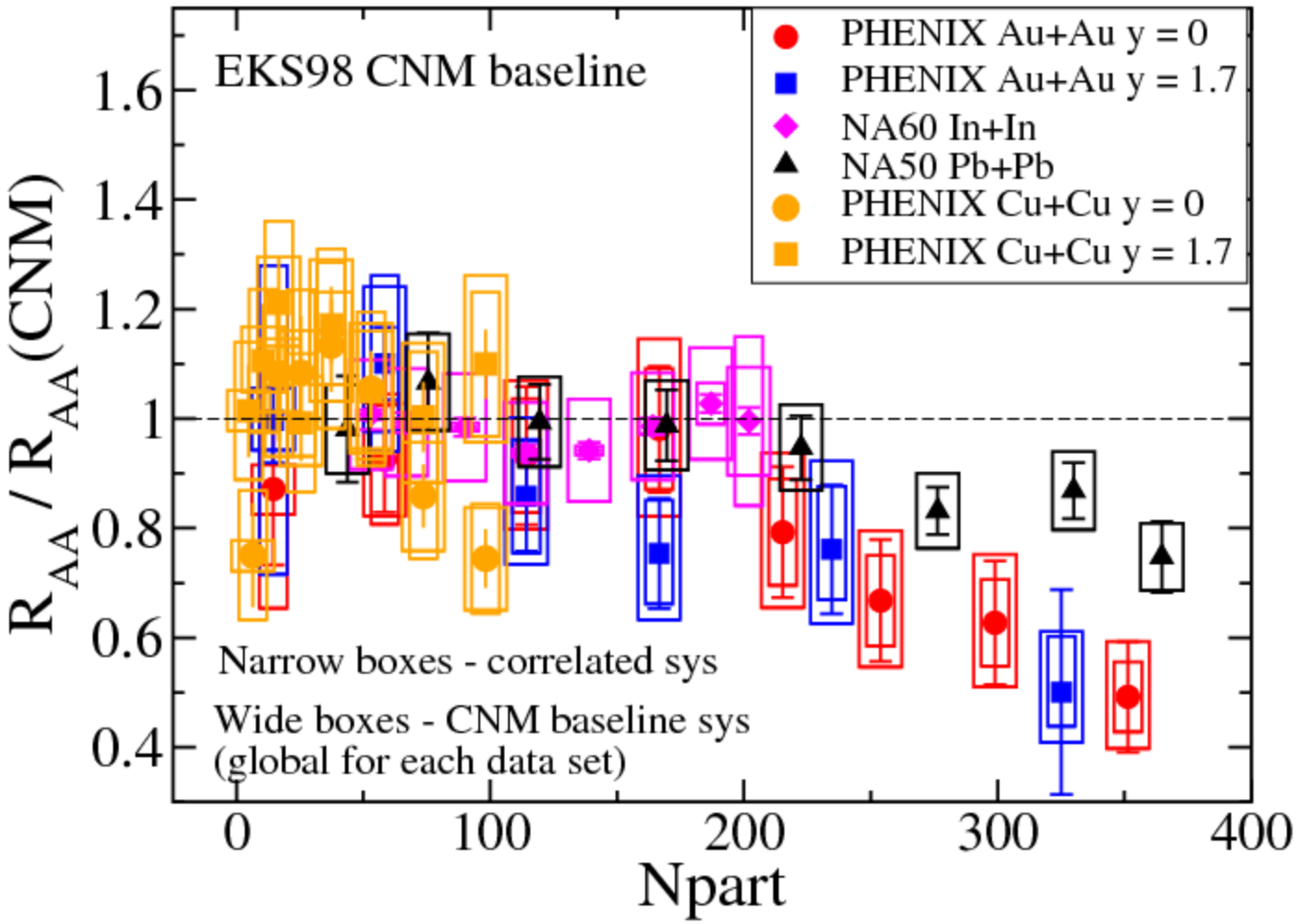
In+In: Binning = {2.,5.,10.,15.,22.,28.,39.,40.}
Npart = {203.4,186.8,164.1,138.9,113.7,90.3,67.3,50.6}
Area = {108.9,102.9,94.5,85.5,76.4,67.3,58.4,52.3}
Impact = {1.18,2.33,3.4,4.39,5.34,6.22,7.3,8.56}

# Anomalous Suppression vs Npart

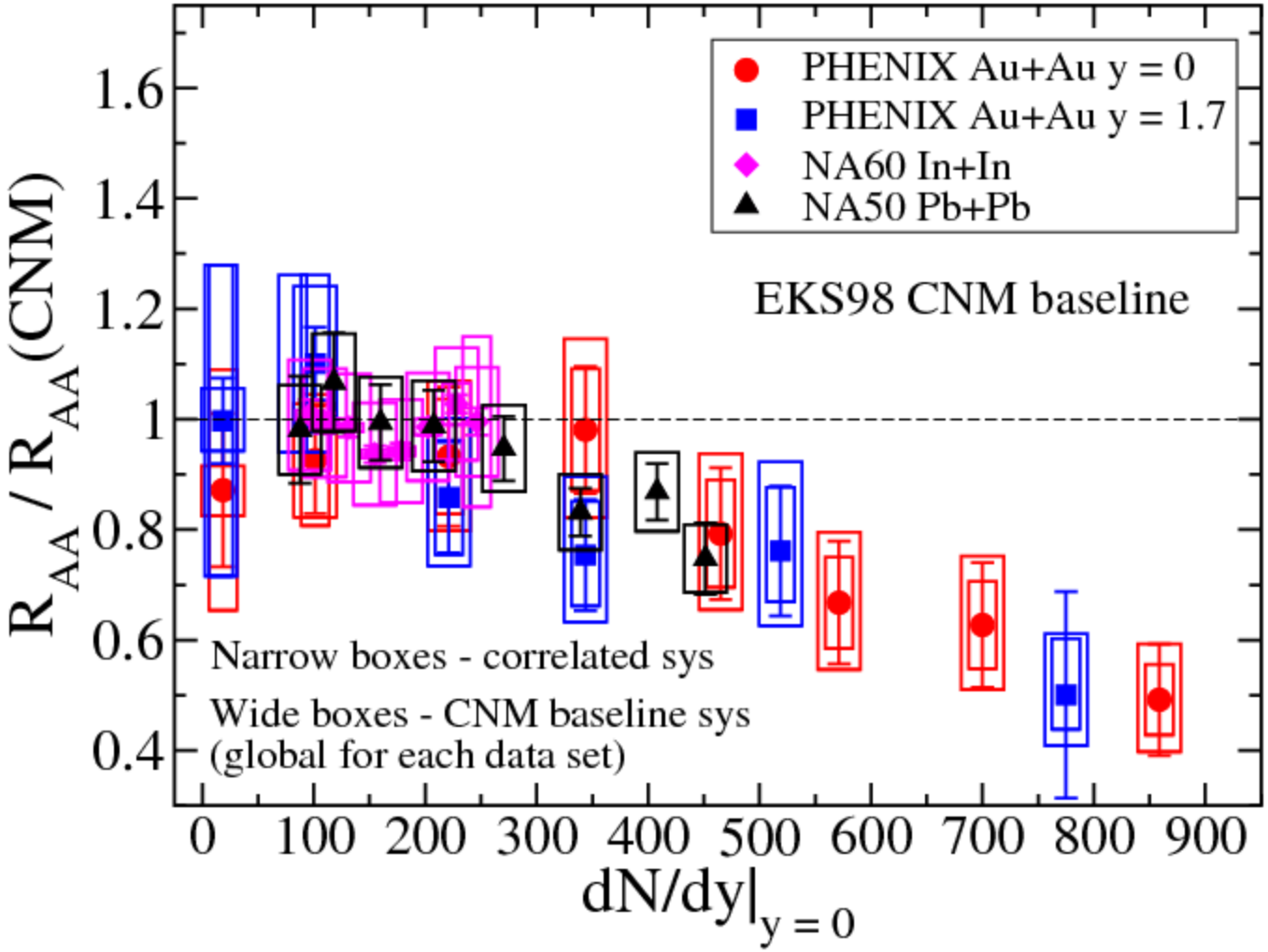
## SPS & PHENIX separate at large Npart



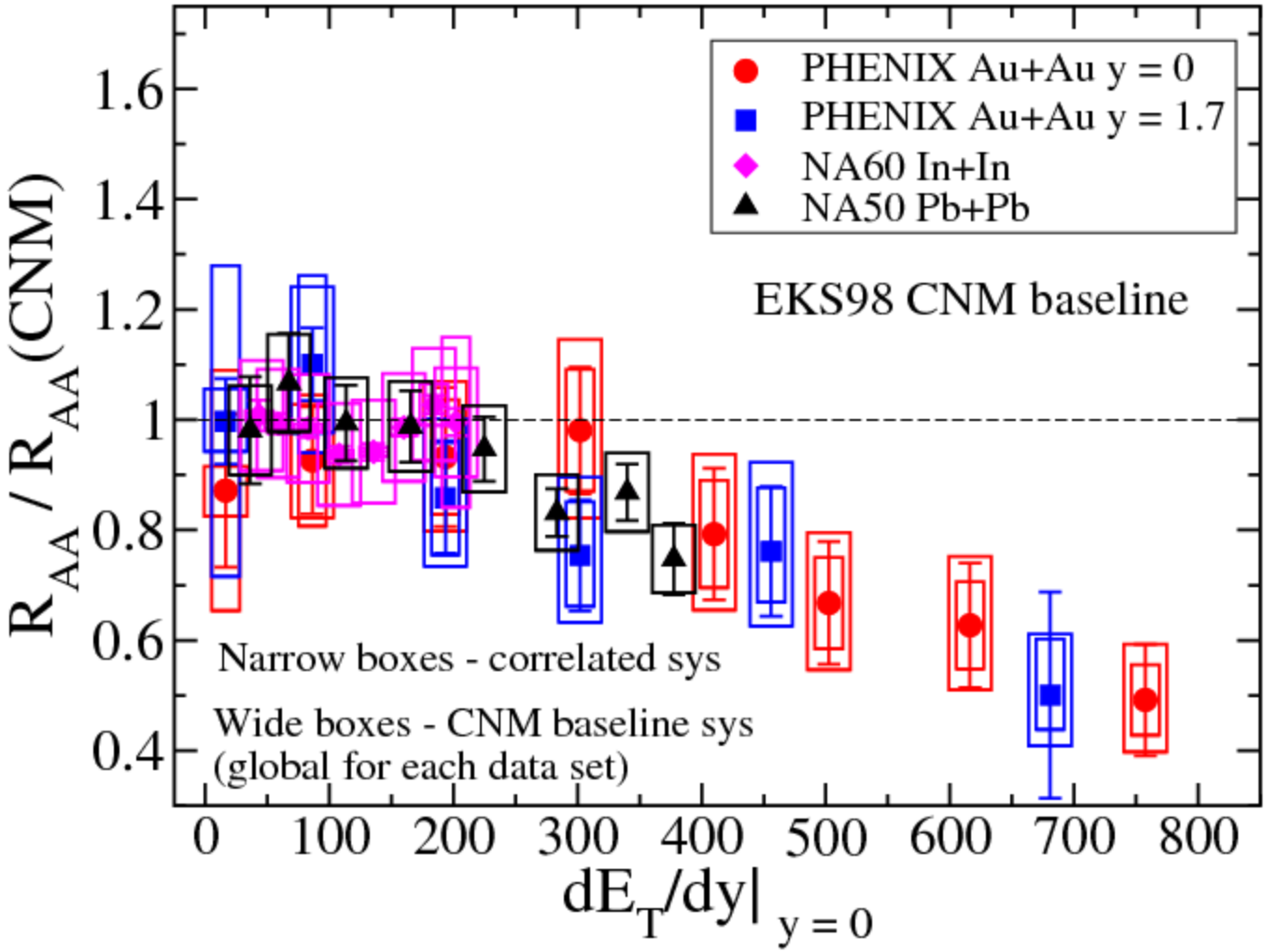
# Anomalous Suppression vs Npart
## With PHENIX CuCu added



# Anomalous Suppression vs $dN_{ch}/d\eta$



# Anomalous Suppression vs $dE_T/d\eta$

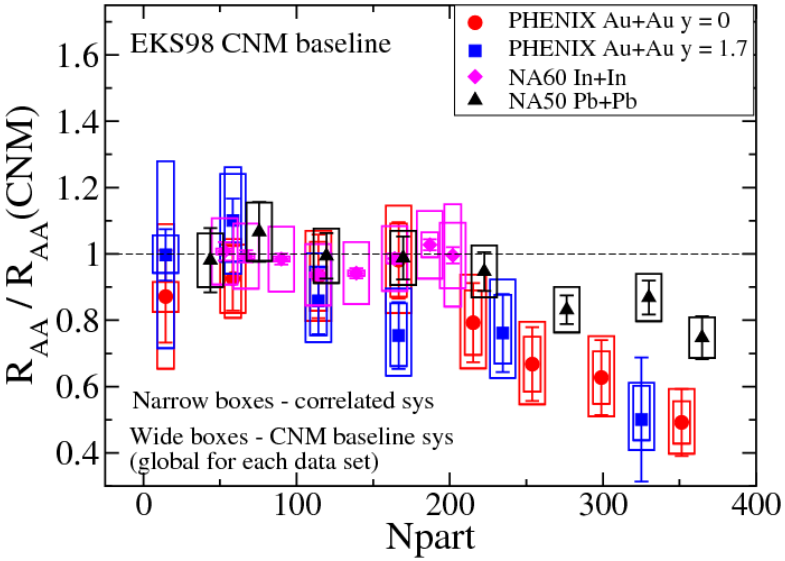


# Comparing Anomalous Suppression at RHIC & SPS vs Energy Density

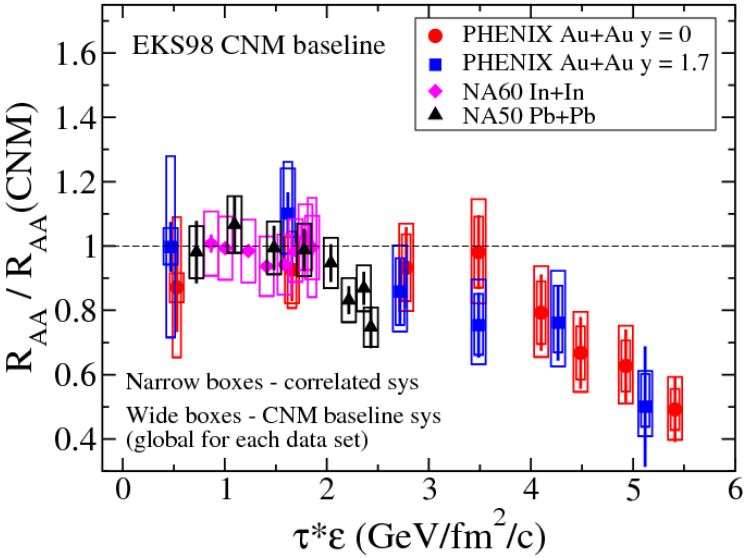
<u>View with Caution</u> - Many systematic uncertainties on relative (SPS vs RHIC) energy density scales:

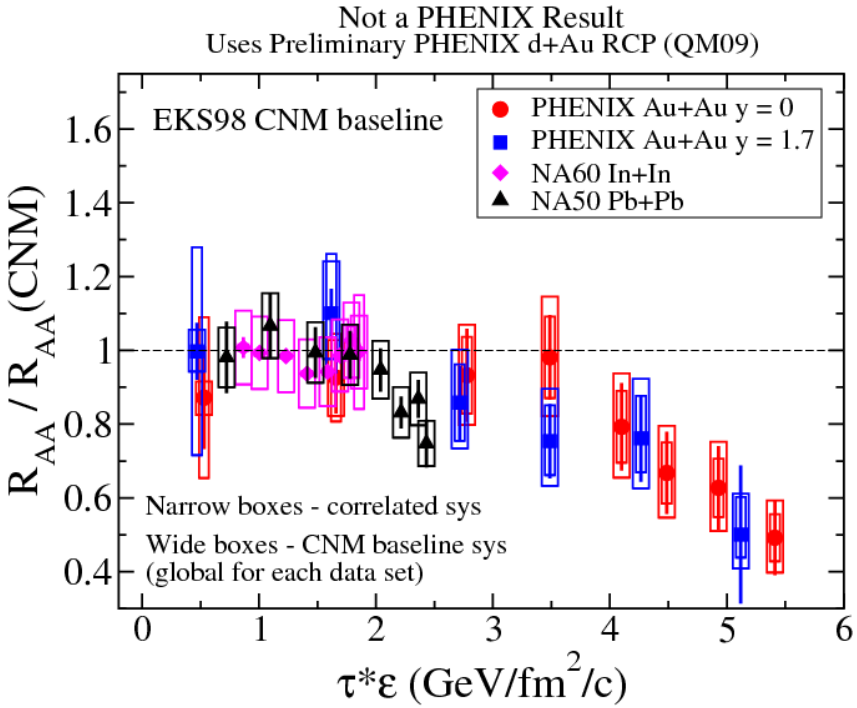
- Using WA98 for $dE_T/dy$ at NA50/60 (matches best with dN/dy from Roberta Analdi)
  - substantially different from NA49 values (~25%)?

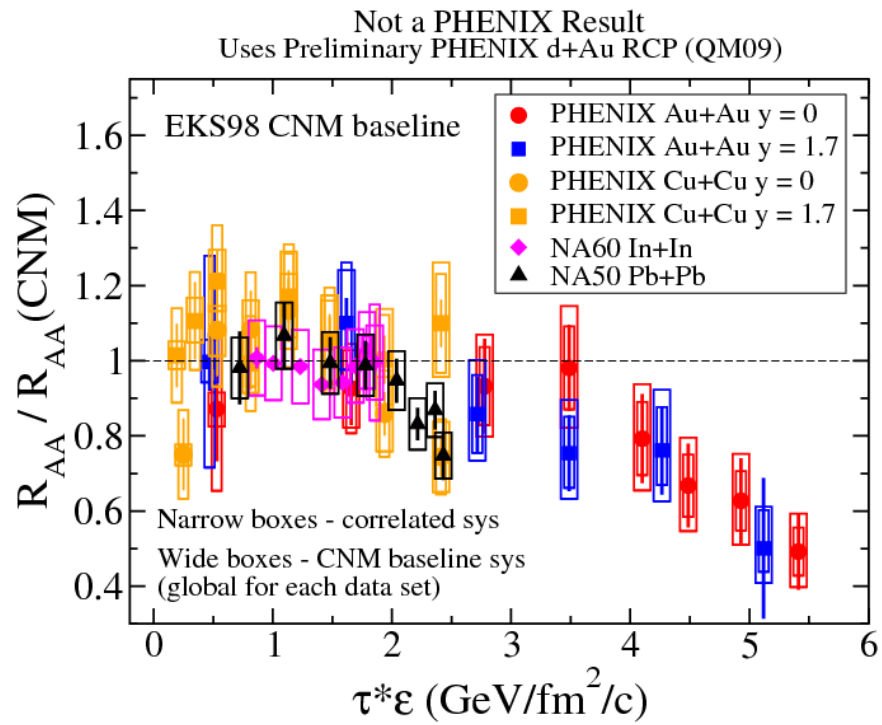
  *see PRC 71, 034908 (2005)*
- use Glauber MC for NA50/60 areas
- Use tau*energy density scale; but is tau same or different between SPS & RHIC energy?
- No Cu+Cu dN/dy or $dE_T/dy$ at RHIC, so using Au+Au values at same $N_{part}$




Not a PHENIX Result
Uses Preliminary PHENIX d+Au RCP (QM09)




Not a PHENIX Result
Uses Preliminary PHENIX d+Au RCP (QM09)
EKS98 CNM baseline
PHENIX Au+Au y = 0
PHENIX Au+Au y = 1.7
NA60 In+In
NA50 Pb+Pb
Narrow boxes - correlated sys
Wide boxes - CNM baseline sys
(global for each data set)
$R_{AA} / R_{AA}(CNM)$
$\tau*\varepsilon$ (GeV/fm$^2$/c)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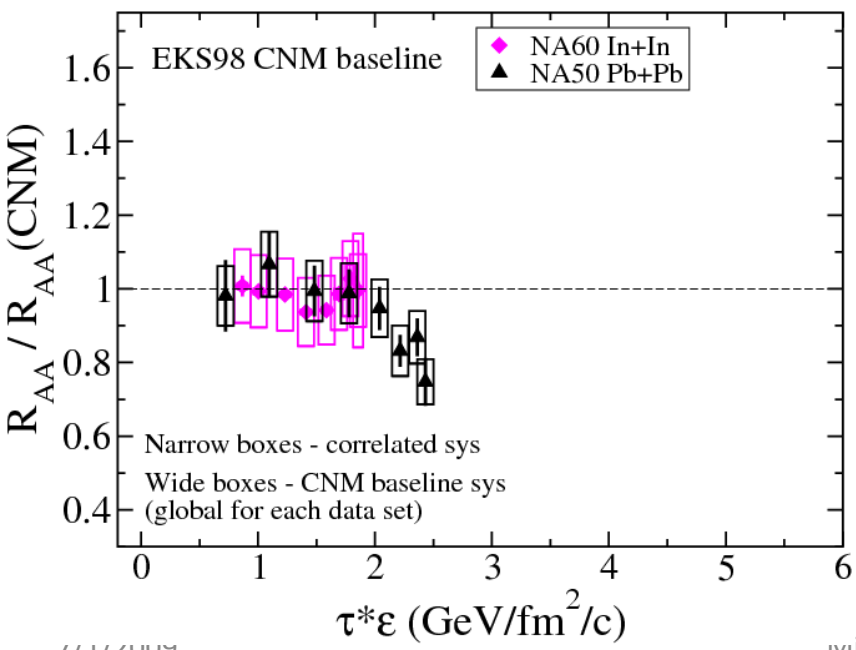
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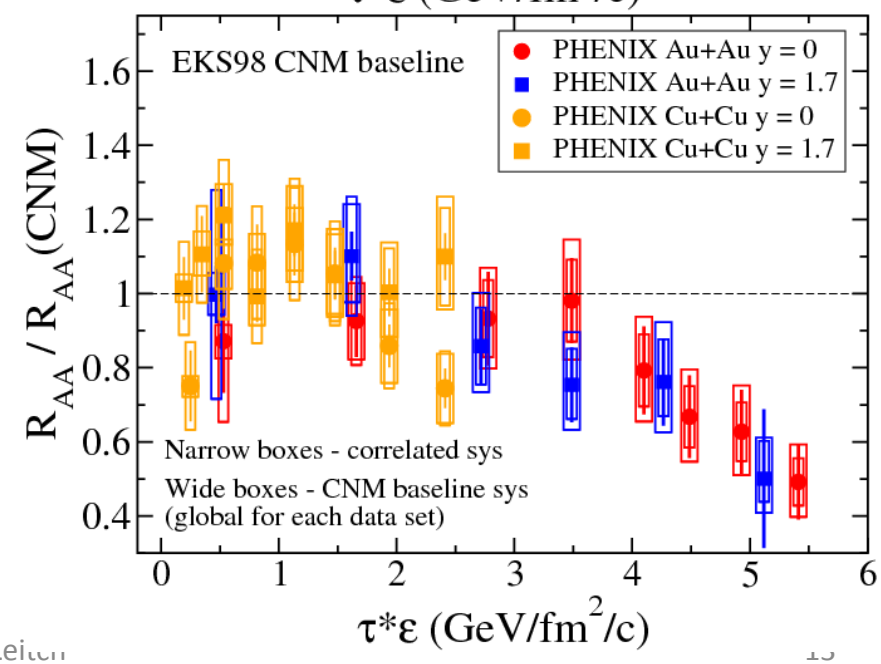
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