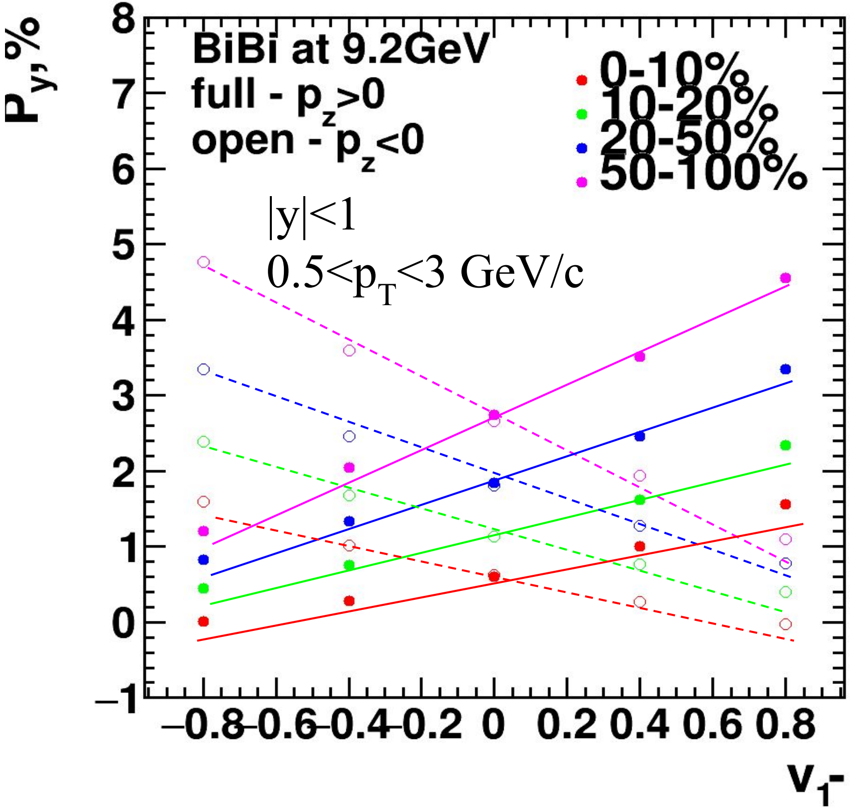
Correlation between P_y and v_1

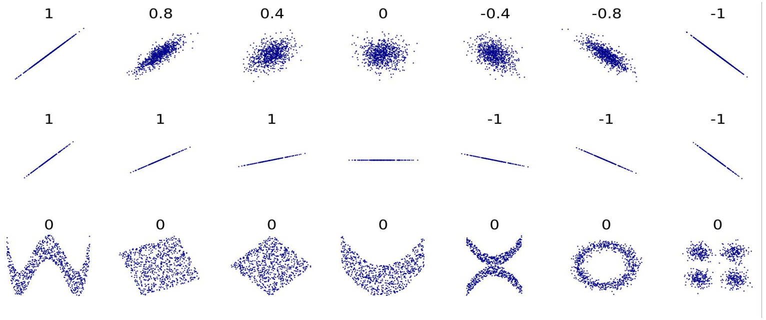


- $P_y(v_1)$ is difficult to use for correlation analysis
- Pearson correlation coefficient represent linear correlation between two sets of data from -1 to 1

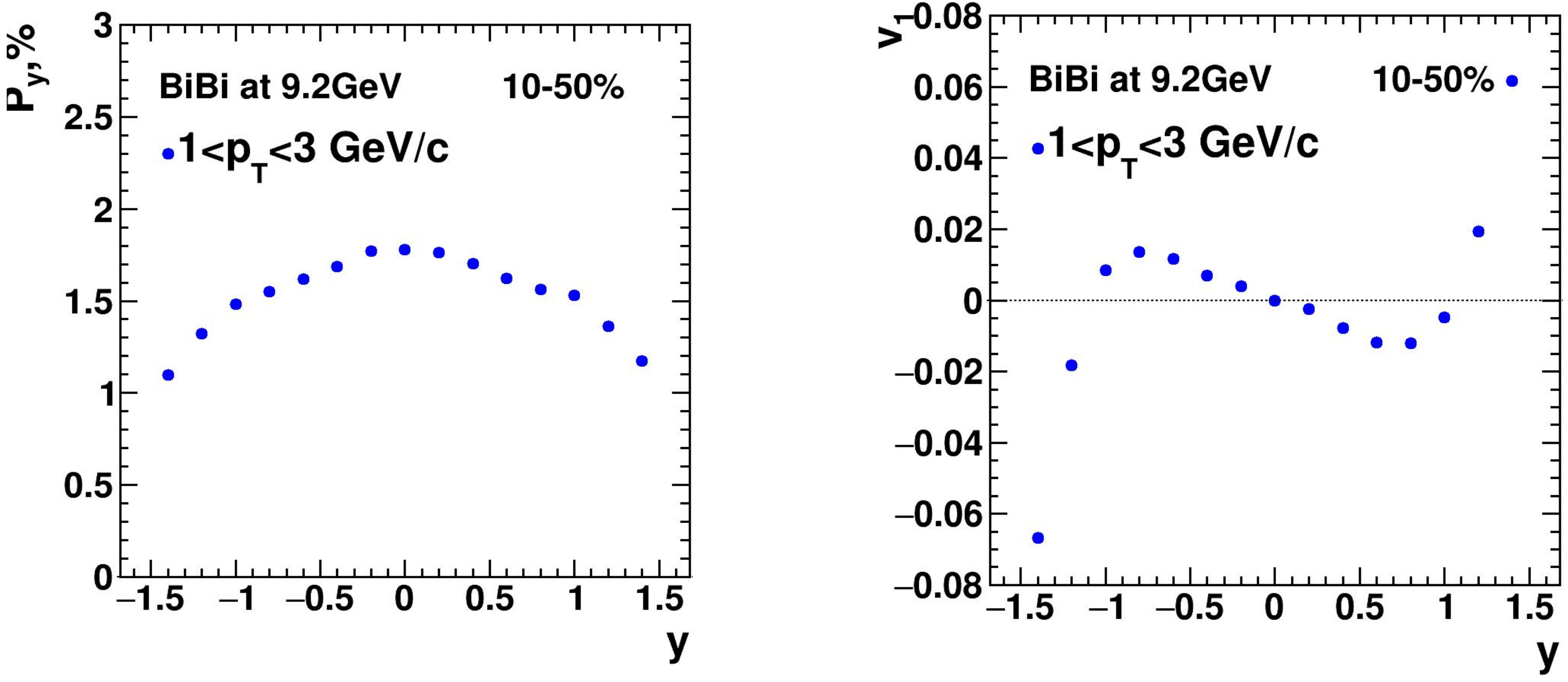
$$\rho(X,Y) = \frac{Cov(X,Y)}{Var(X)Var(Y)}$$

$$Cov(X,Y) = \langle XY \rangle - \langle X \rangle \langle Y \rangle$$

$$Var(X) = \sqrt{\langle X^2 \rangle - \langle X \rangle^2}$$

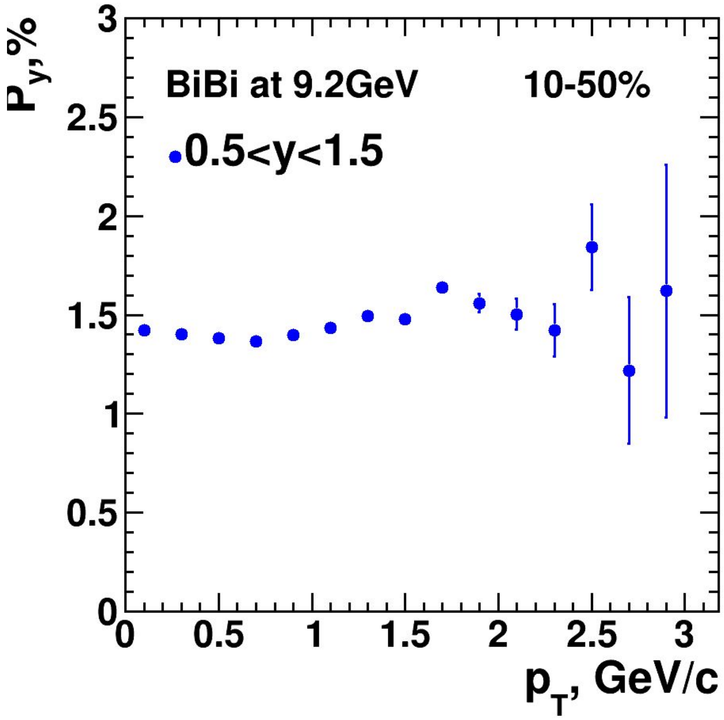


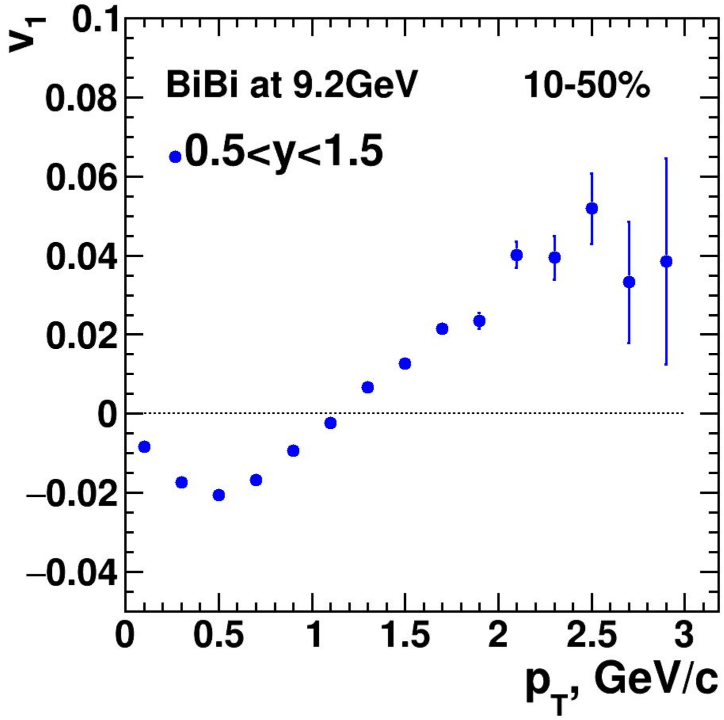
P_y (y) and v_1(y) dependence of Primary Λ



- Low signal for both observables
- Highest signal in mid-rapidity for P_y, where $v_1 \approx 0$

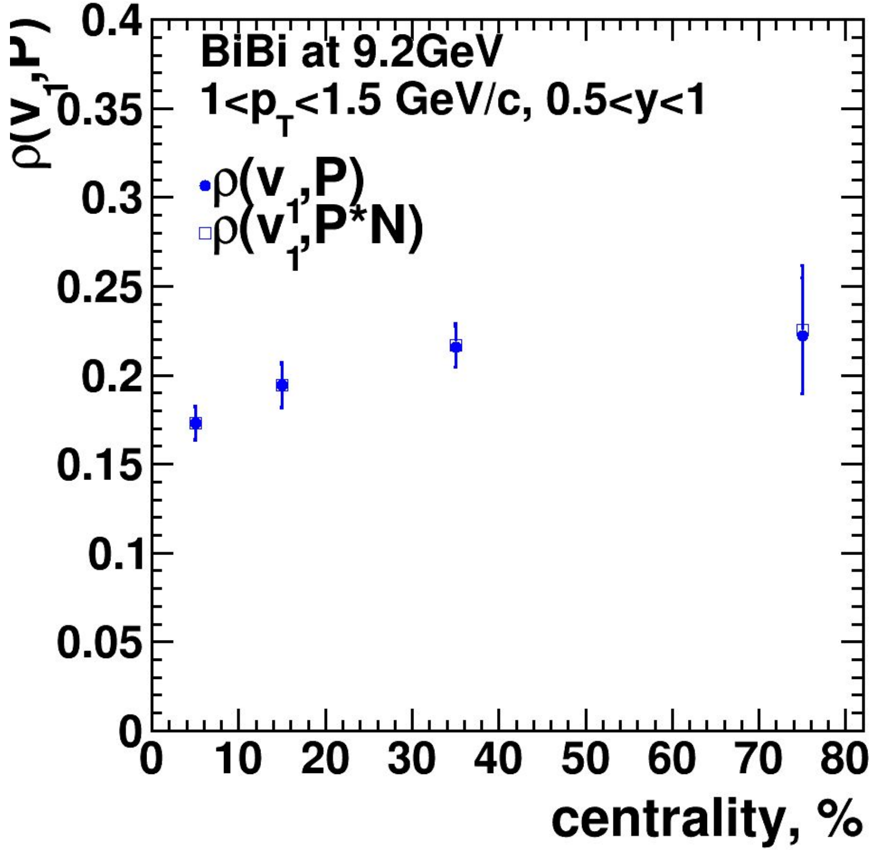
P_y (p_T) and v_1(p_T) dependence of Primary Λ





- Low p_T dependence for P_y
- Better to investigate p_T>1.2 GeV/c (change sign of v_1 around 1 GeV/c)

Pearson correlation coefficient as a function of centrality



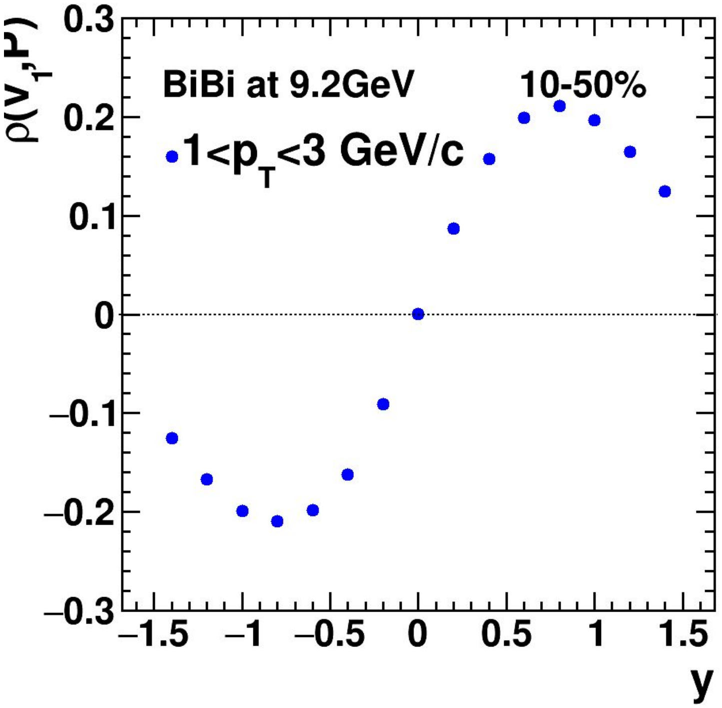
$$\rho(P, v_1) = \frac{\langle P v_1\rangle - \langle P\rangle\langle v_1\rangle}{(\sqrt{\langle v_1^2\rangle - \langle v_1\rangle^2})(\sqrt{\langle P^2\rangle - \langle P\rangle^2})}$$

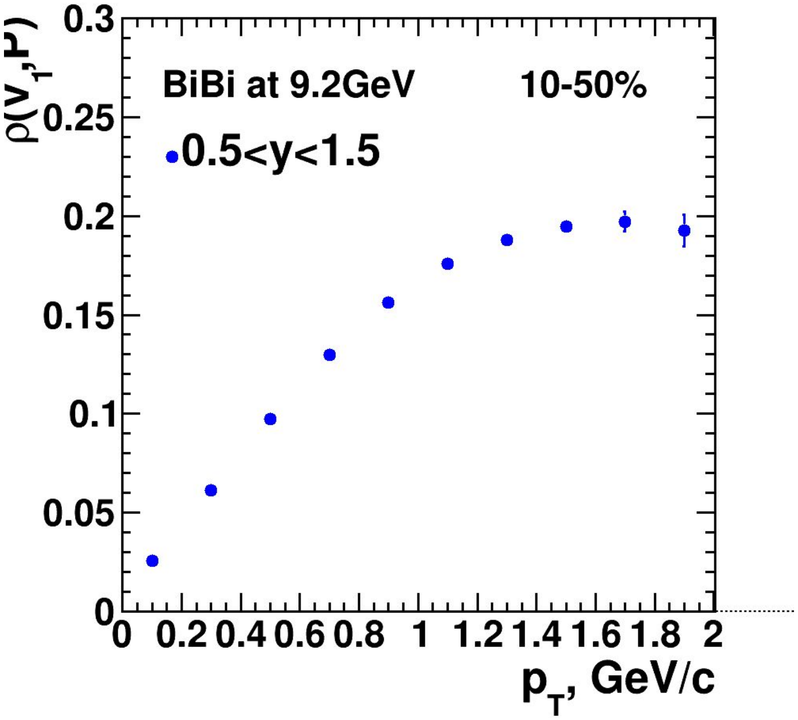
$$\rho(P, v_1 * N) = \frac{\rho(P,v_1) - \rho(P,N)\rho(v_1,N)}{(\sqrt{1-\rho(P,N)^2})(\sqrt{1-\rho(v_1,N)^2})}$$

N - multiplicity of Primary Λ

- Weak centrality dependence of Pearson correlation coefficient
- Effect of multiplicity of Primary Λ is negligible

Pearson correlation coefficient as a function of y and p_T

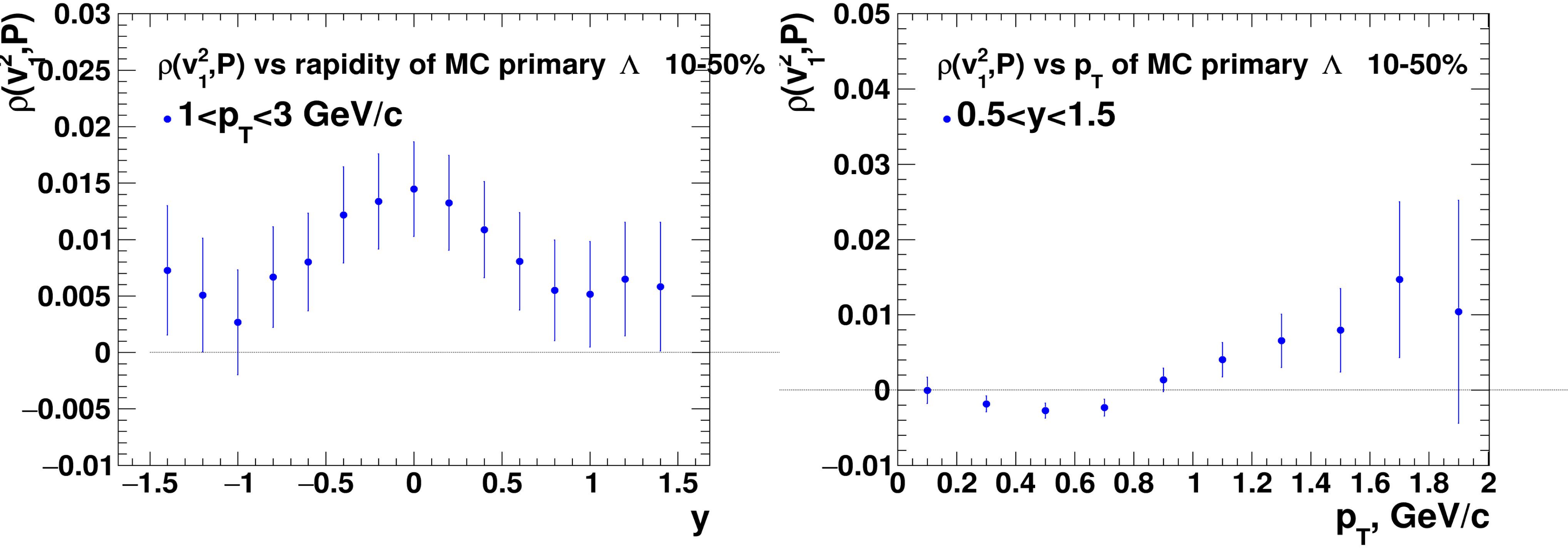




$$\rho(P, v_1) = \frac{\langle P v_1 \rangle - \langle P \rangle \langle v_1 \rangle}{(\sqrt{\langle v_1^2 \rangle - \langle v_1 \rangle^2})(\sqrt{\langle P^2 \rangle - \langle P \rangle^2})}$$

- moderate linear dependence between P_y and v_1
- increasing with p_T
- highest for $0.5<y<1$

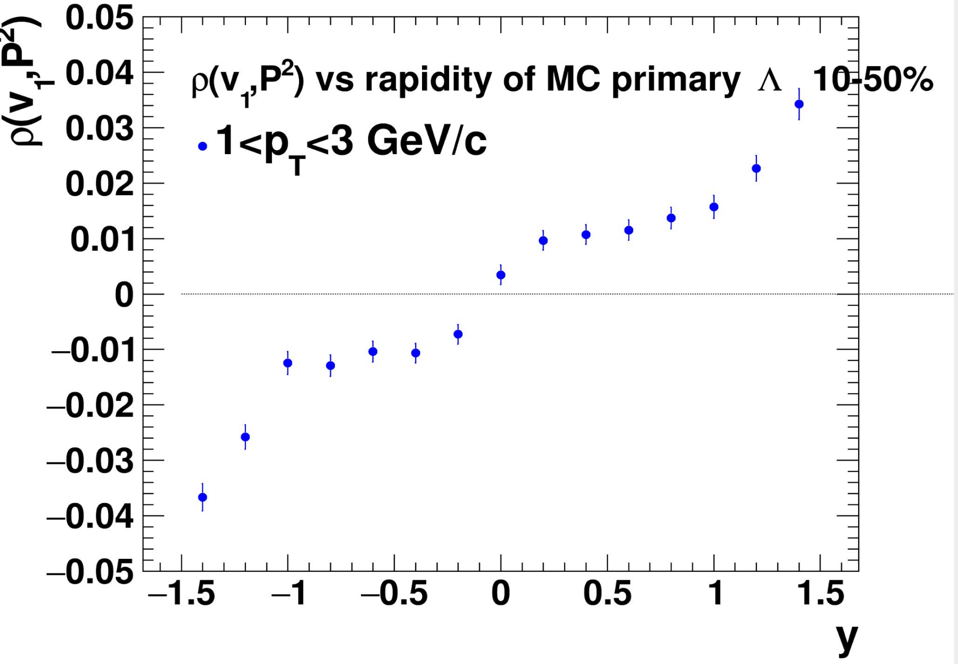
Pearson correlation coefficient between P_y and v_1^2

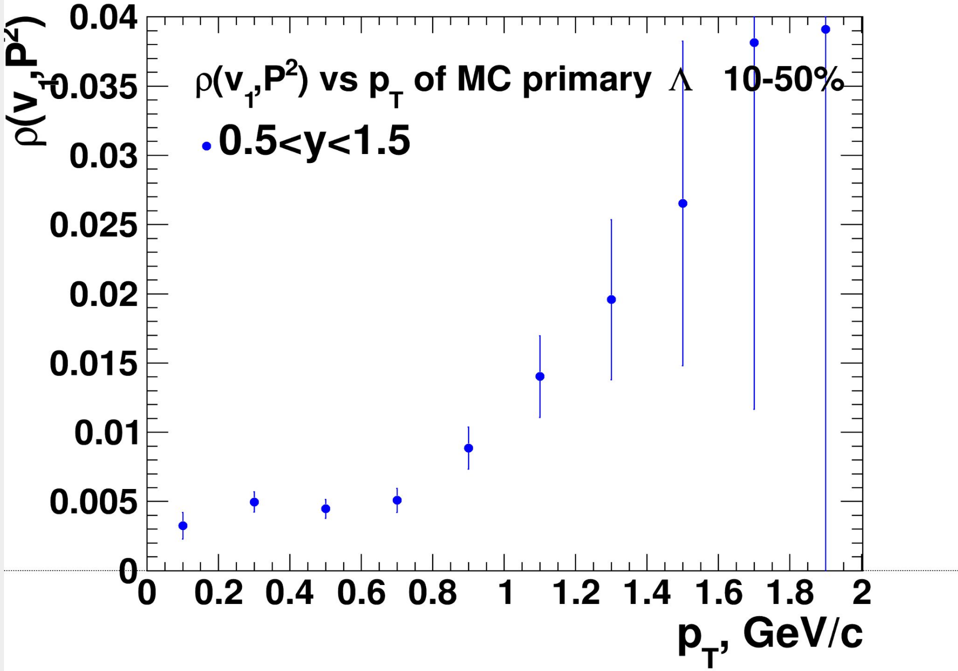


$$\rho(P, v_1^2) = \frac{\langle P v_1^2 \rangle - \langle P \rangle \langle v_1^2 \rangle}{(\sqrt{\langle v_1^4 \rangle - \langle v_1^2 \rangle^2})(\sqrt{\langle P^2 \rangle - \langle P \rangle^2})}$$

Weak linear dependence between P_y and v_1^2

Pearson correlation coefficient between v_1 and P_y^2





$$\rho(P^2, v_1) = \frac{\langle P^2 v_1\rangle - \langle P^2\rangle\langle v_1\rangle}{(\sqrt{\langle v_1^2\rangle - \langle v_1\rangle^2})(\sqrt{\langle P^4\rangle - \langle P^2\rangle^2})}$$

Weak linear dependence between P_y^2 and v_1