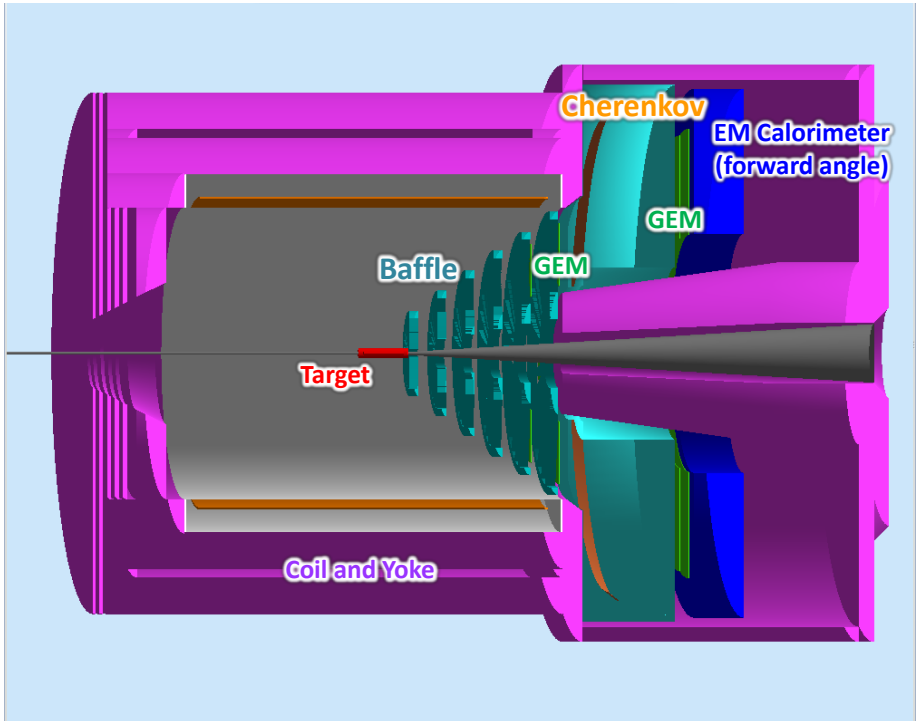
PVDIS with SoLID

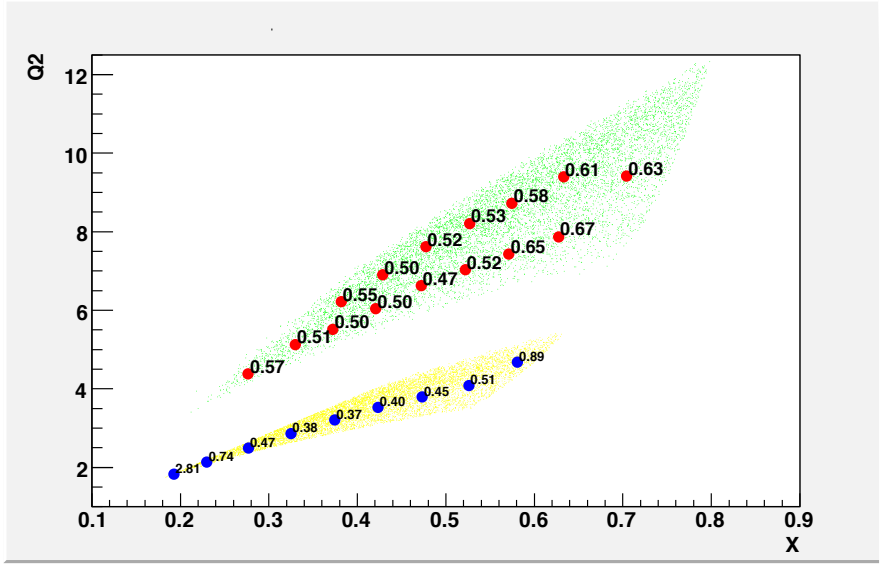
$$A_{\rm PV} = \frac{\sigma^l - \sigma^r}{\sigma^l + \sigma^r} \approx \frac{\mathcal{M}^l_{Z^0} - \mathcal{M}^r_{Z^0}}{\mathcal{M}_\gamma}$$

$$\propto -\left(\frac{G_{\rm F}Q^2}{4\pi\alpha}\right)\left(g_A^e g_V^T + \beta g_V^e g_A^T\right)$$

Involves both EW coupling and QCD Physics

$$A_{PV} = \frac{G_F Q^2}{\sqrt{2}\pi\alpha}\left[\mathbf{a}(x) + Y(y)\,\mathbf{b}(x)\right]$$



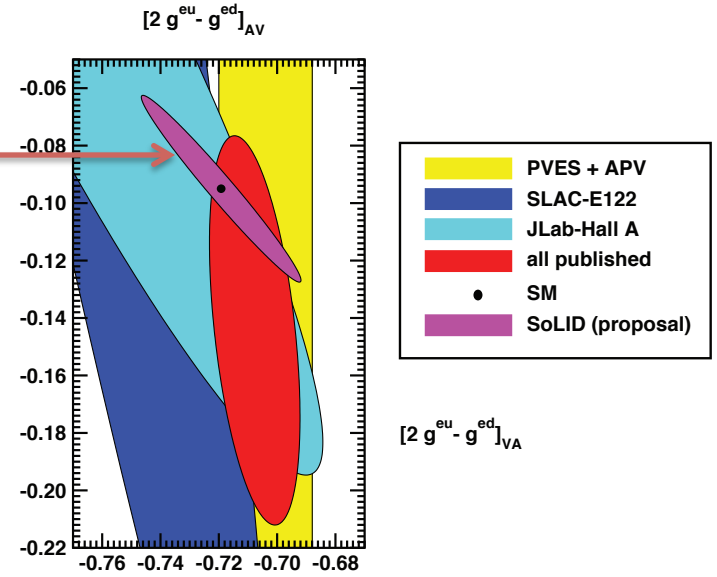


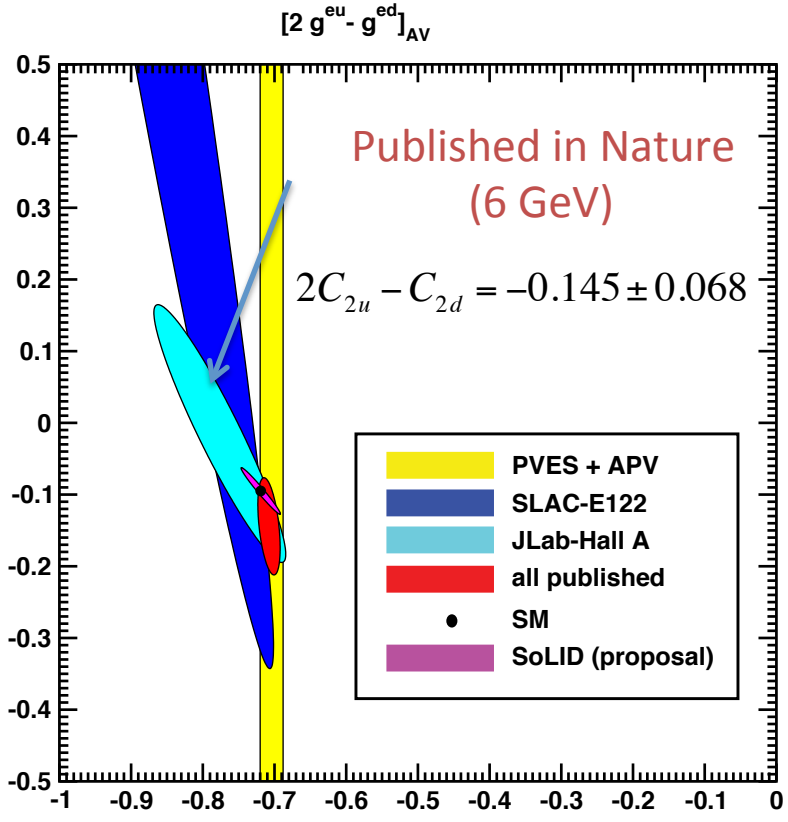
New Physics

$$b(x) = \frac{\sum_i C_{2i} Q_i f_i^-(x)}{\sum_i Q_i^2 f_i^+(x)}$$

PVDIS is the only way to measure the small C_{2q}

SoLID projection



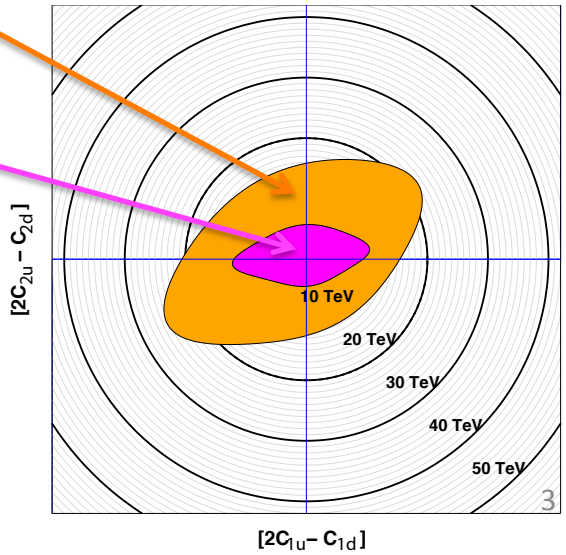


$$\mathcal{L}_{f_1 f_2} = \sum_{i,j=L,R} \frac{(g_{ij}^{12})^2}{\Lambda_{ij}^2} \bar{f}_{1i} \gamma_\mu f_{1i} \bar{f}_{2j} \gamma_\mu f_{2j}$$

SoLID

6 GeV

Composite model mass limits



QCD Physics with different targets

CSV at Quark Level

$$\delta u(x) = u^p(x) - d^n(x)$$

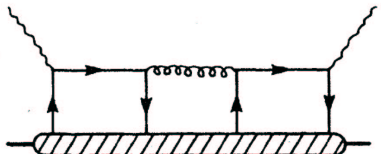
$$\delta d(x) = d^p(x) - u^n(x)$$

$$R_{CSV} = \frac{\delta A_{PV}(x)}{A_{PV}(x)} = 0.28\,\frac{\delta u(x) - \delta d(x)}{u(x) + d(x)}$$

^{2}H (isoscalar)

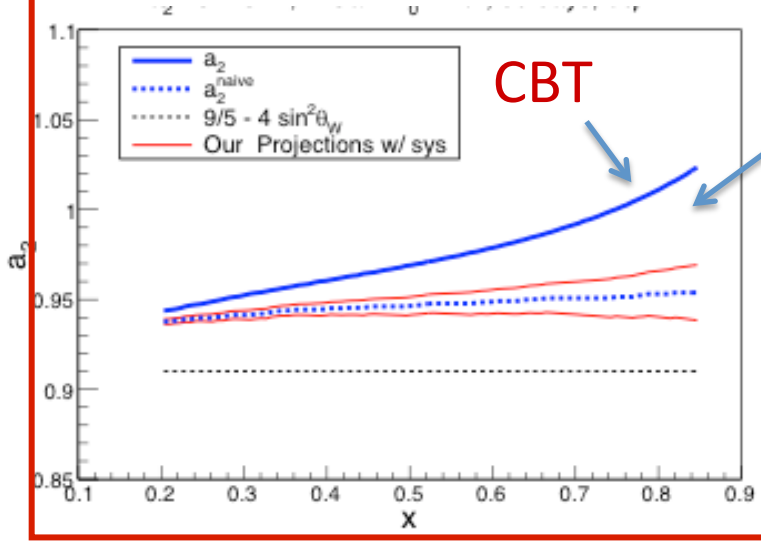
$$a(x) = \frac{\sum_i C_{1i} Q_i f_i^+(x)}{\sum_i Q_i^2 f_i^+(x)}$$

Di-quarks in the nucleon (Q^2 Dependence)

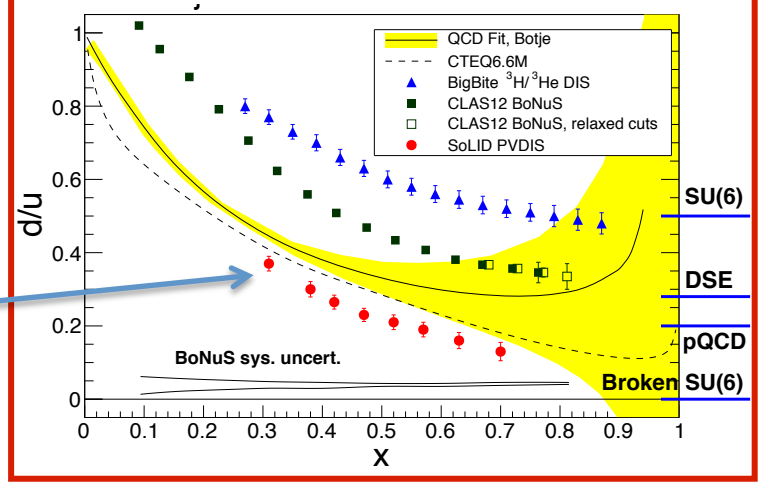


Explain NuTeV??

Isovector EMC effect



Measure d/u without nuclear effects



Backup

$$A = A\left[1 + \beta_{HT}\frac{1}{(1-x)^3 Q^2} + \beta_{CSV}x^2\right]$$