Extraction of Neutron Spin Structure

- Extraction of neutron spin structure functions (SSFs) from the RSS proton and deuteron data
- Smeared proton SSFs need to be subtracted from the deuteron SSFs.
- We employ Bodek-Ritchie version of Atwood-West smearing technique
- Need to unsmear the neutron results

Smearing Procedure

- Need to obtain smeared proton g_1 and g_2
- Form the convolution of the momentum distribution and on-shell quantities

$$F(Q^2,\nu) = \int_0^\infty \mid f(\vec{p}) \mid^2 g(Q^2, W', \nu') d\vec{p}$$

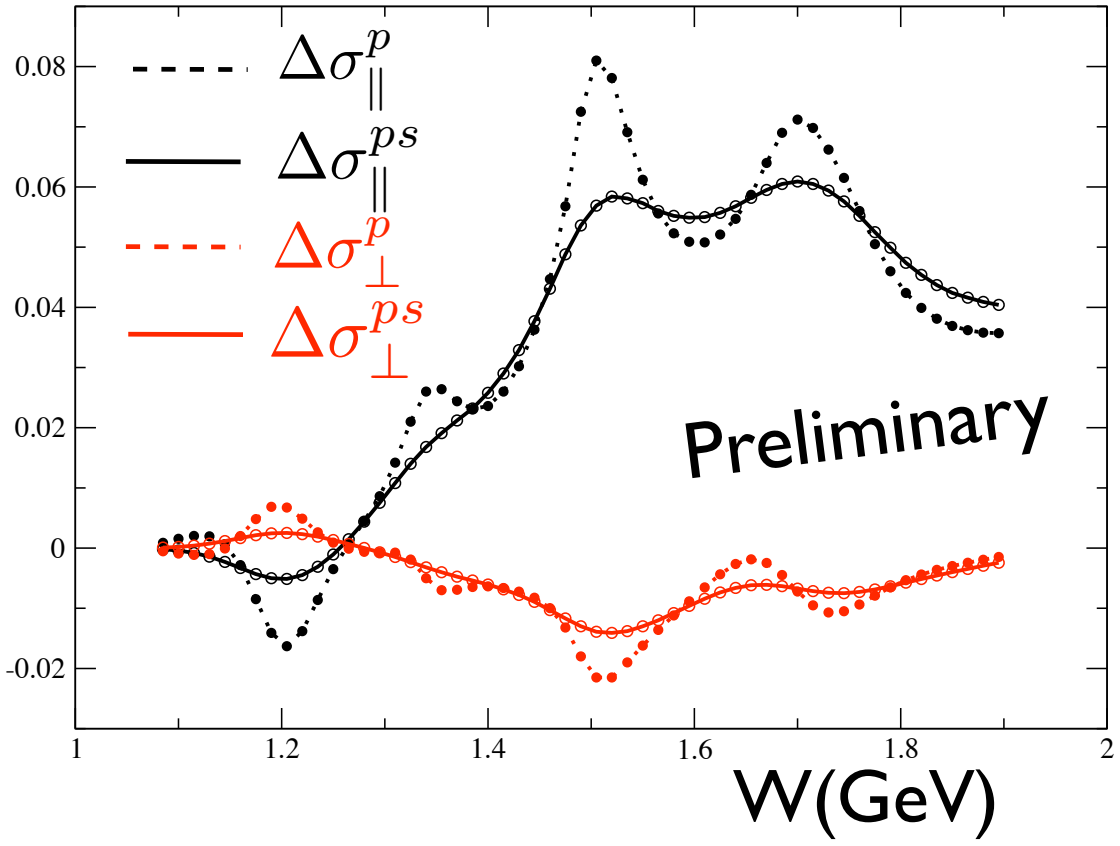
- $\mid f(\vec{p}) \mid^2$ is the deuteron W.F. squared in momentum space

$$\begin{matrix} g_1^p \\ g_2^p \end{matrix} \rightarrow \begin{matrix} \Delta\sigma_\parallel^p(g_1^p, g_2^p) \\ \Delta\sigma_\perp^p(g_1^p, g_2^p) \end{matrix} \xrightarrow{\text{Smear}} \begin{matrix} \Delta\sigma_\parallel^{ps} \\ \Delta\sigma_\perp^{ps} \end{matrix} \rightarrow \begin{matrix} g_1^{ps} \\ g_2^{ps} \end{matrix} \rightarrow \begin{matrix} g_1^{ns} = g_1^d - g_1^{ps} \\ g_2^{ns} = g_2^d - g_2^{ps} \end{matrix}$$

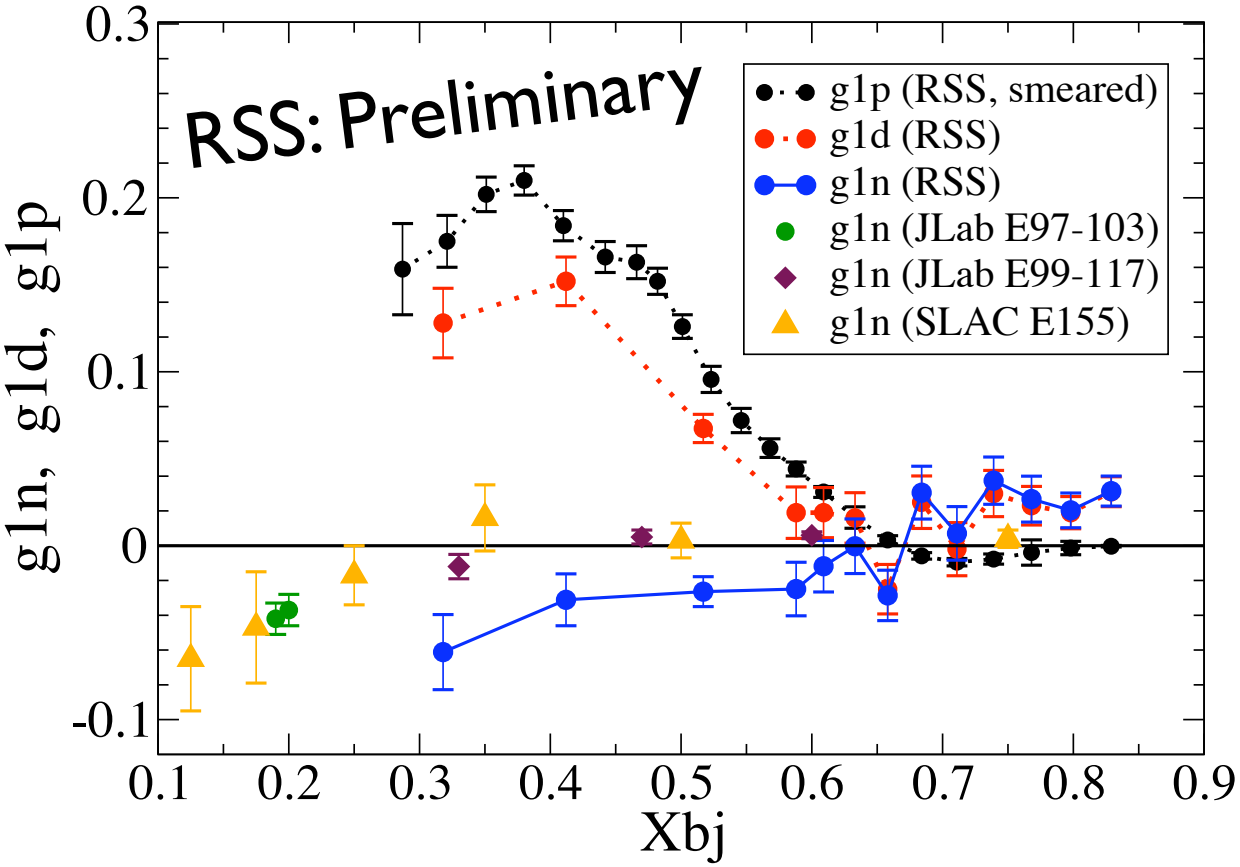
$\Delta\sigma$: Difference between cross sections with opposite beam helicities

Effect of Smearing

- Using proton data fit and Paris W.F. for the deuteron

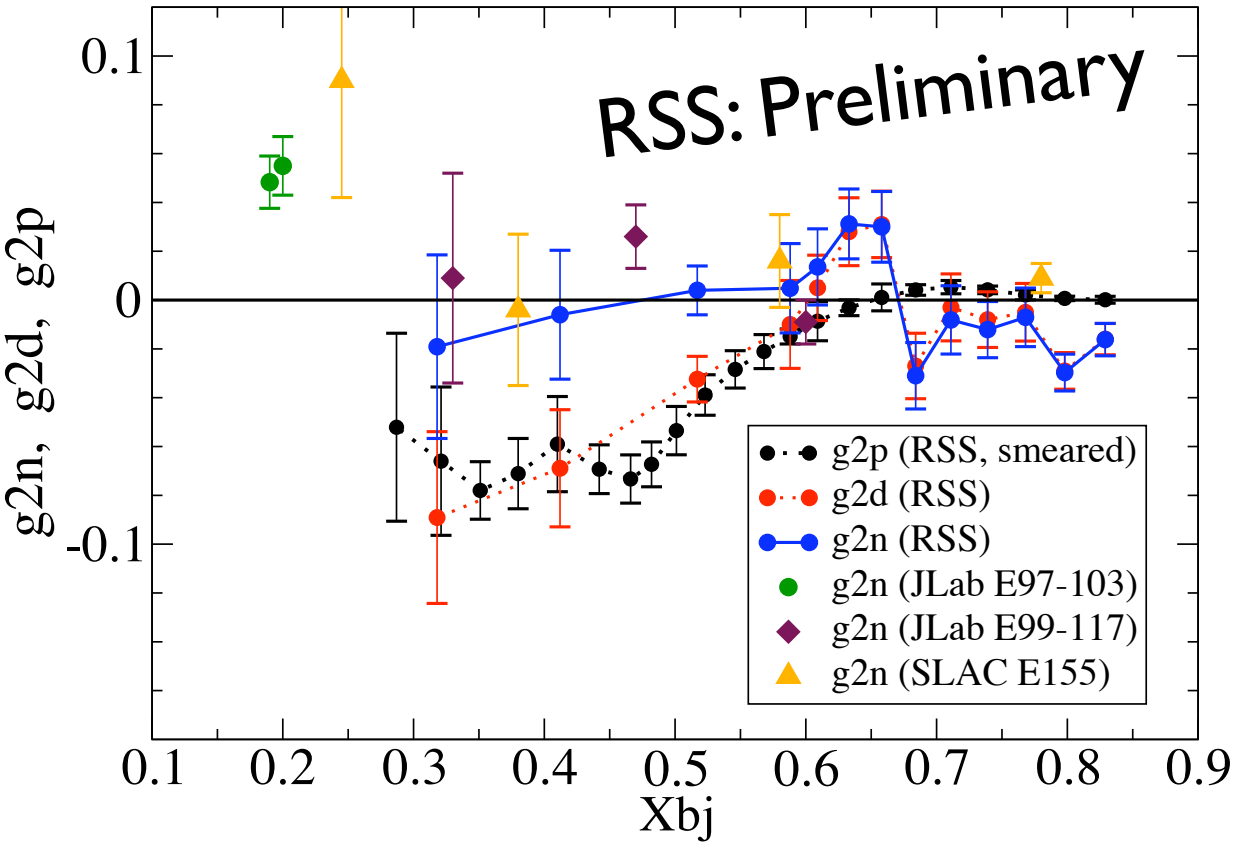


Smeared Neutron g_1 versus x



- Radiative corrections not applied yet to the RSS Deuteron data.
- Previous measurements (JLab E97-103, E99-117, SLAC) were in the Deep Inelastic Scattering (DIS) region

Smeared Neutron g_2 versus x



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