A_{NN} and A_{SS} from pp2pp Experiment

A_{NN} and A_{SS}, general comments

The spin dependent elastic cross section is:

$$\sigma=\sigma_0[1+A_N(\mathbf{P_b}+\mathbf{P_y})\mathbf{n}+A_{NN}(\mathbf{P_b n})(\mathbf{P_y n})+A_{SS}(\mathbf{P_b s})(\mathbf{P_y s})]$$

where

n-unit vector of normal to scattering plane,

k=**p**/|p| is p-beam momentum

s=**n**×**k** Note: **s** is not radial

In the case of both beams polarized vertically:

$$\sigma=\sigma_0[1+A_N(P_b+P_y)\cos\varphi+P_bP_y(A_{NN}\cos^2\varphi+A_{SS}\sin^2\varphi)]$$

Due to vertical orientation of RP ($\varphi=\pm\pi/2$) pp2pp in run 2003 was more sensitive to A_{SS} than to A_{NN}.

Calculation of double spin asymmetries

Raw asymmetry:

$$\delta(\varphi) = \frac{N^{++}(\varphi)/L^{++} + N^{--}(\varphi)/L^{--} - N^{+-}(\varphi)/L^{+-} - N^{-+}(\varphi)/L^{-+}}{N^{++}(\varphi)/L^{++} + N^{--}(\varphi)/L^{--} + N^{+-}(\varphi)/L^{+-} + N^{-+}(\varphi)/L^{-+}} =$$

$$= P_B P_Y (A_{SS}\cos^2(\varphi) + A_{NN}\sin^2(\varphi))$$

Luminosity normalization is done using both:

1. The machine bunch intensities: $L^{ij} \sim \Sigma I^i_B \cdot I^j_Y$ over bunches with given i,j combination
2. The inelastic counters

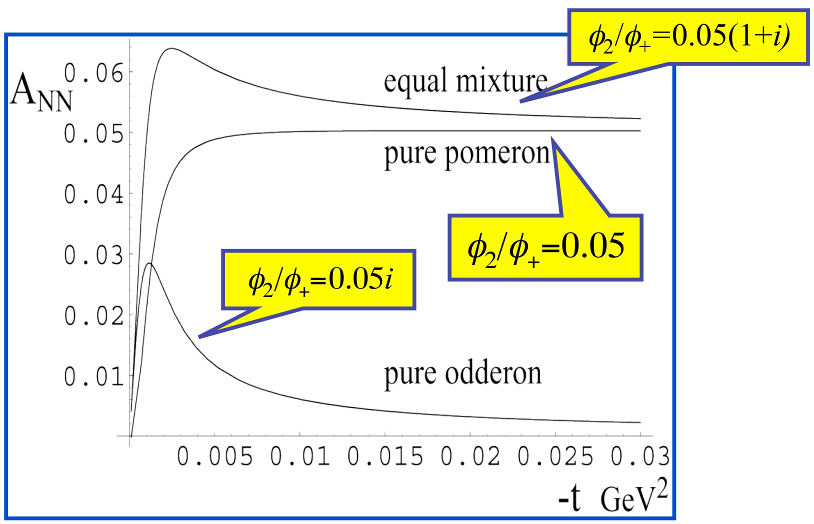
The two methods agreed.

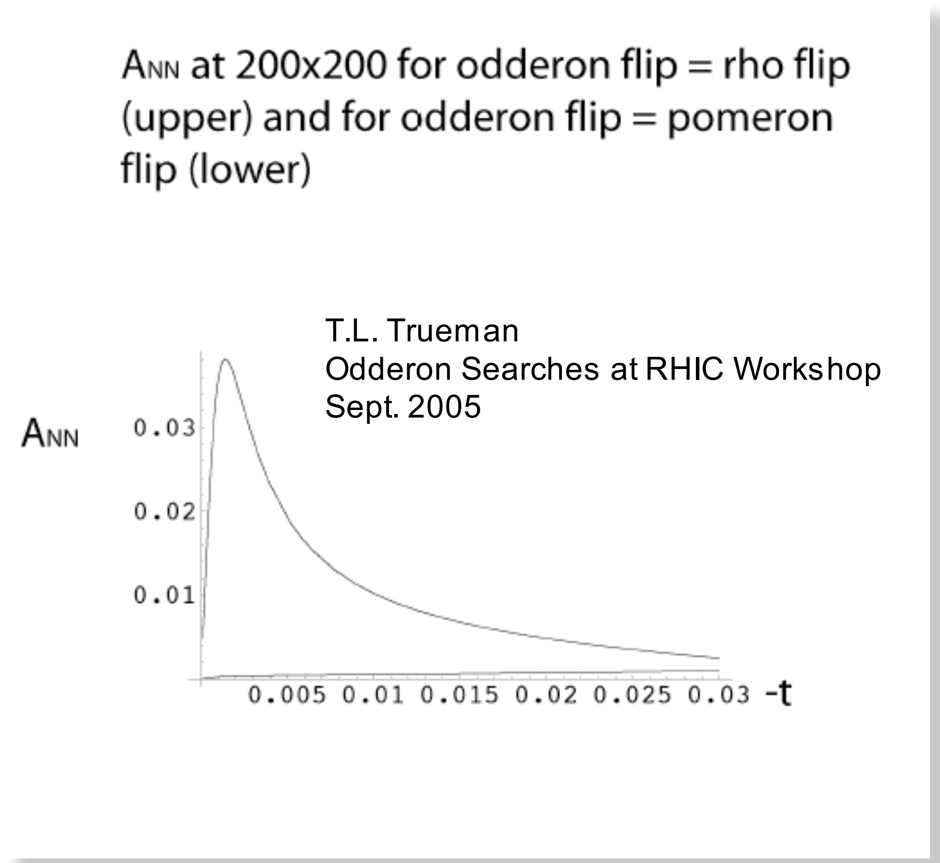
Distributions $\delta(\varphi)$ were fitted with $(P_1 \cdot \sin^2\varphi + P_2 \cdot \cos^2\varphi)$

$P_1 = P_B \cdot P_Y \cdot A_{SS}$ and $P_2 = P_B \cdot P_Y \cdot A_{NN}$

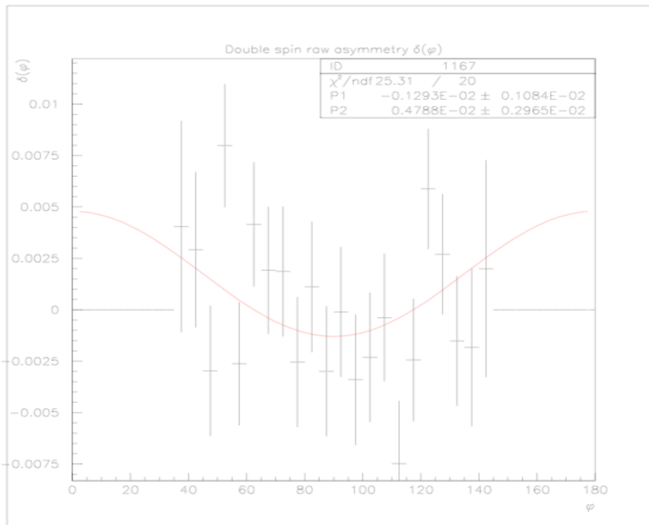
Results: A_{NN} and A_{SS}

$\lvert t\rvert$-range, $(GeV/c)^2$	$<\lvert t\rvert>$, $(GeV/c)^2$	A_{SS}	$\sigma_{Ass\ (stat.)}$	A_{NN}	$\sigma_{Ann\ (stat.)}$	χ^2/n
0.010-0.030	**0.019**	**-0.0067**	**0.0056**	**0.0248**	**0.0154**	**25.3/20**





A_{NN}, A_{SS} raw asymmetries



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$P_1 = P_B \cdot P_Y \cdot A_{SS}$ and $P_2 = P_B \cdot P_Y \cdot A_{NN}$