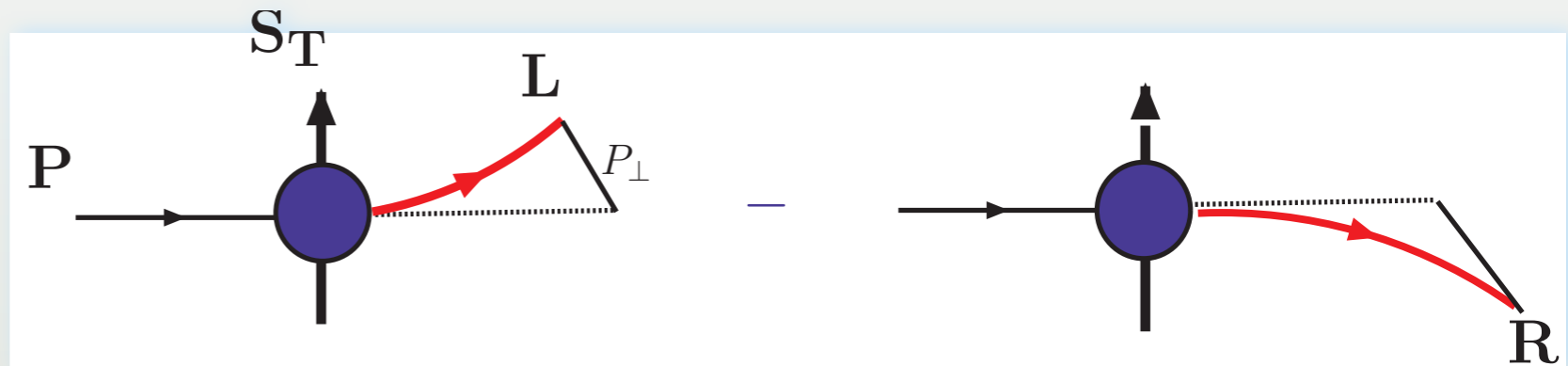


*Transverse Spin Phenomena and Their Impact on QCD*  
*In Honor of Gary Goldstein's 70th Birthday*  
*October 28-29, 2010*



# Transverse SPIN Observables SSA (TSSA) $P^\uparrow P \rightarrow \pi X$

- Single Spin Asymmetry

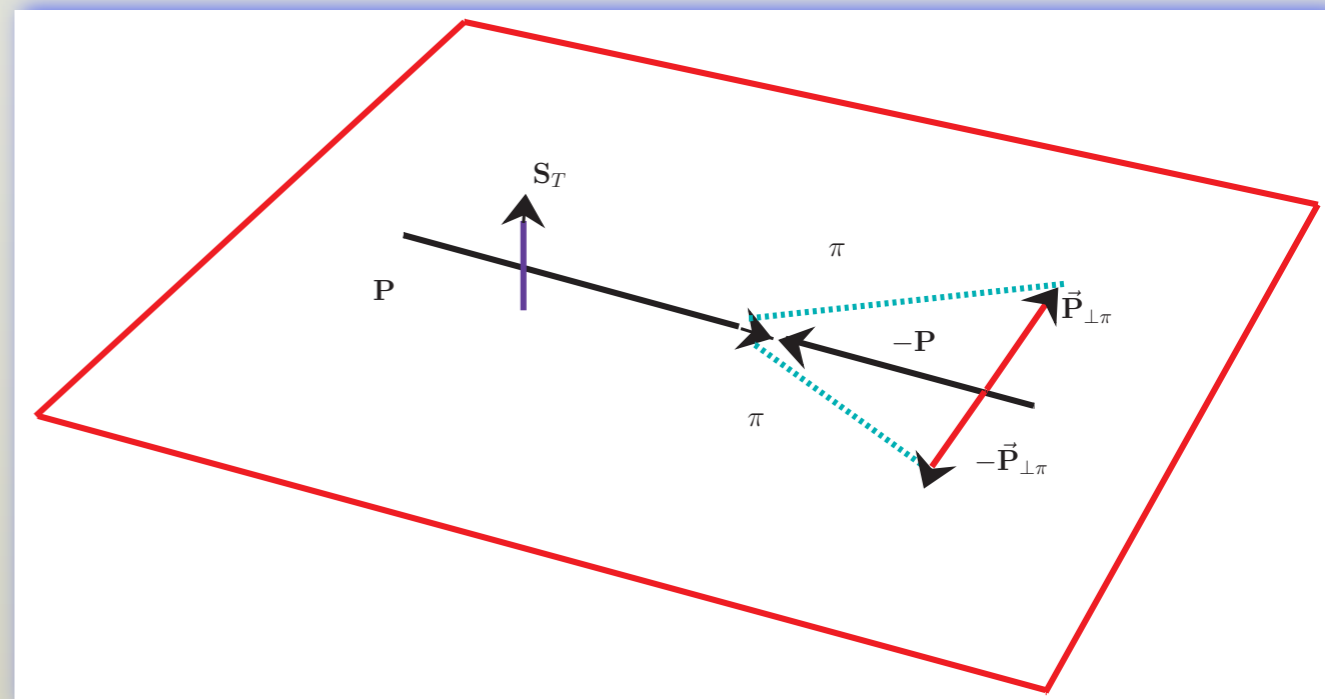


Parity Conserving interactions: SSAs Transverse Scattering plane

$$\Delta\sigma \sim iS_T \cdot (\mathbf{P} \times \mathbf{P}_\perp^\pi)$$

- Rotational invariance  $\sigma^\downarrow(x_F, \mathbf{p}_\perp) = \sigma^\uparrow(x_F, -\mathbf{p}_\perp)$   
 $\Rightarrow$  **Left-Right Asymmetry**

$$A_N = \frac{\sigma^\uparrow(x_F, \mathbf{p}_\perp) - \sigma^\uparrow(x_F, -\mathbf{p}_\perp)}{\sigma^\uparrow(x_F, \mathbf{p}_\perp) + \sigma^\uparrow(x_F, -\mathbf{p}_\perp)} \equiv \Delta\sigma$$



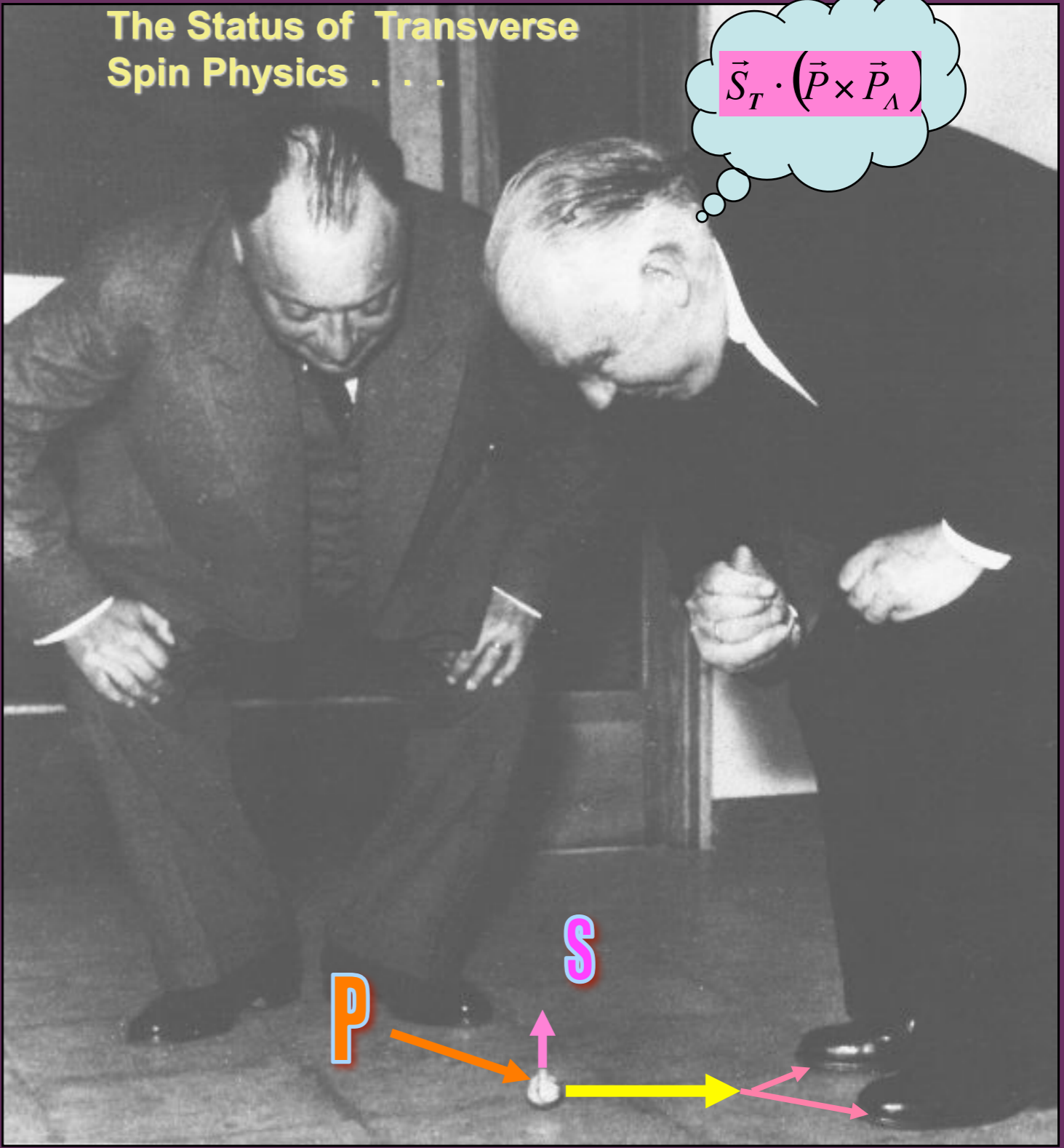
# The Status of Transverse Spin Physics . . .

$$\vec{S}_T \cdot (\vec{P} \times \vec{P}_A)$$



# The Status of Transverse Spin Physics . . .

$$\vec{S}_T \cdot (\vec{P} \times \vec{P}_A)$$



# Present here aspects of transversity and transverse spin polarization phenomena

- Gary Goldstein and Mike Moravcsik, Ann. Phys. 98, 128 (1976); Ann. Phys. 142, 219 (1982)
- John Ralston & Davison Soper NPB 152 (1979)
- Dennis Sivers, Phys. Rev. D 41, 83 (1990); 43, 261 (1991)
- Bob Jaffe & Xiangdong Ji, Phys. Rev. Lett. 67, 552 (1991)
- Jacques Soffer, Phys. Rev. Lett. 74, 1292 (1995)
- Gary Goldstein, Bob Jaffe and Xiangdong Ji, Phys. Rev. D52, 5006 (1995)

# Present here who have been instrumental in Gary's Career

- Kamesh Wali, Ph.D advisor of Gary
-

# Special Thanks to JLAB

- David Richards JLAB for support encouragement guiding us through
- Theory Group-Mike Pennington, Wally Melnitchouk and Christain Weiss
- Staff support Mary Fox, Ruth Bizot



- Simonetta Liuti who's conceived of the idea to celebrate GaryFEST as a workshop at JLAB