Meson Cloud Models

- $|p\rangle = |p_0\rangle + a|N\pi\rangle + b|\Delta\pi\rangle$

$$\Rightarrow \text{ a: } \quad |N\pi\rangle = \begin{cases} |p,\pi^0\rangle & \frac{u\bar{u}+d\bar{d}}{2} \\ |n,\pi^+\rangle & u\bar{d} \end{cases}$$

$$\Rightarrow \text{ b: } \quad |\Delta\pi\rangle = \begin{cases} |\Delta^{++},\pi^-\rangle & d\bar{u} \\ |\Delta^{+},\pi^0\rangle & \frac{u\bar{u}+d\bar{d}}{2} \\ |\Delta^{0},\pi^+\rangle & u\bar{d} \end{cases}$$

- $$\int_0^1 (\bar{d}-\bar{u})\,dx = \frac{1}{3}(2a-b) = 0.100 \pm 0.007 \pm 0.017$$
(NuSea)

- Recent calculations find $a \approx 2b$

  Phys. Rev. **D 53** (1996) 2586 and

  Nucl. Phys. **A 570** (1994) 765

  $\Rightarrow a = 2b = 0.20 \pm 0.036$

- $$\frac{\bar{d}}{\bar{u}} = \frac{\frac{5}{6}a + \frac{1}{3}b + \text{pert. sea}}{\frac{1}{6}a + \frac{2}{3}b + \text{pert. sea}}$$