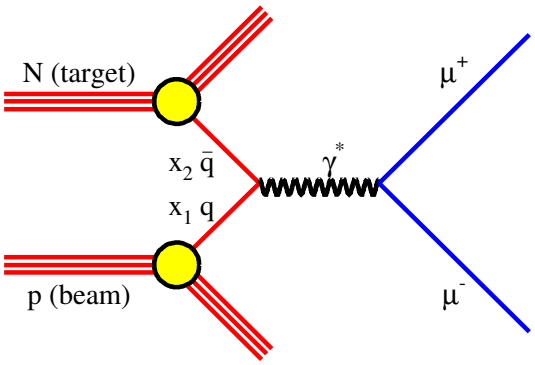
The Drell-Yan Process: $pN \to \mu^+\mu^- X$



- Directly sensitive to antiquark distributions.

$$\sigma^{pN} \propto \sum_i e_i^2 \left[q_i(x_1)\bar{q}_i(x_2) + \bar{q}_i(x_1)q_i(x_2) \right]$$

$$2p_L/\sqrt{s} = x_1 - x_2 \equiv x_F \text{ and } M^2_{\mu^+\mu^-} = s x_1 x_2$$

- Compare Drell-Yan yields from nuclear targets (Liquid H_2 and D_2) and extract $\bar{u}/\bar{d}$.
  if charge symmetry is assumed.

$$\left. \frac{\sigma^{pd}}{2\sigma^{pp}} \right|_{x_F >> 0} \approx \frac{1}{2}\left[1 + \frac{\bar{d}(x)}{\bar{u}(x)} \right]$$

- NA51 $\Rightarrow$ 6,000 events at $x = 0.18$ and $x_F \simeq 0$
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$$\frac{\bar{u}}{\bar{d}} = 0.51 \pm 0.04 \pm 0.05$$