# Unpolarised Quark Distributions

Jörg PRETZ

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Physikalisches Institut, Universität Bonn

# Today only

- $\bar{u}/\bar{d}$

# Idea (DvH)

$N_p^{K^{*-}}$ = number of $K^{*-}$ produced on a proton target

In QPM:

$$\begin{aligned} N_p^{K^{*-}} &= 4uD_u^{K^{*-}} + 4\bar{u}D_{\bar{u}}^{K^{*-}} \\ &= dD_d^{K^{*-}} + \bar{d}D_{\bar{d}}^{K^{*-}} \\ &= sD_s^{K^{*-}} + \bar{s}D_{\bar{s}}^{K^{*-}} \end{aligned}$$

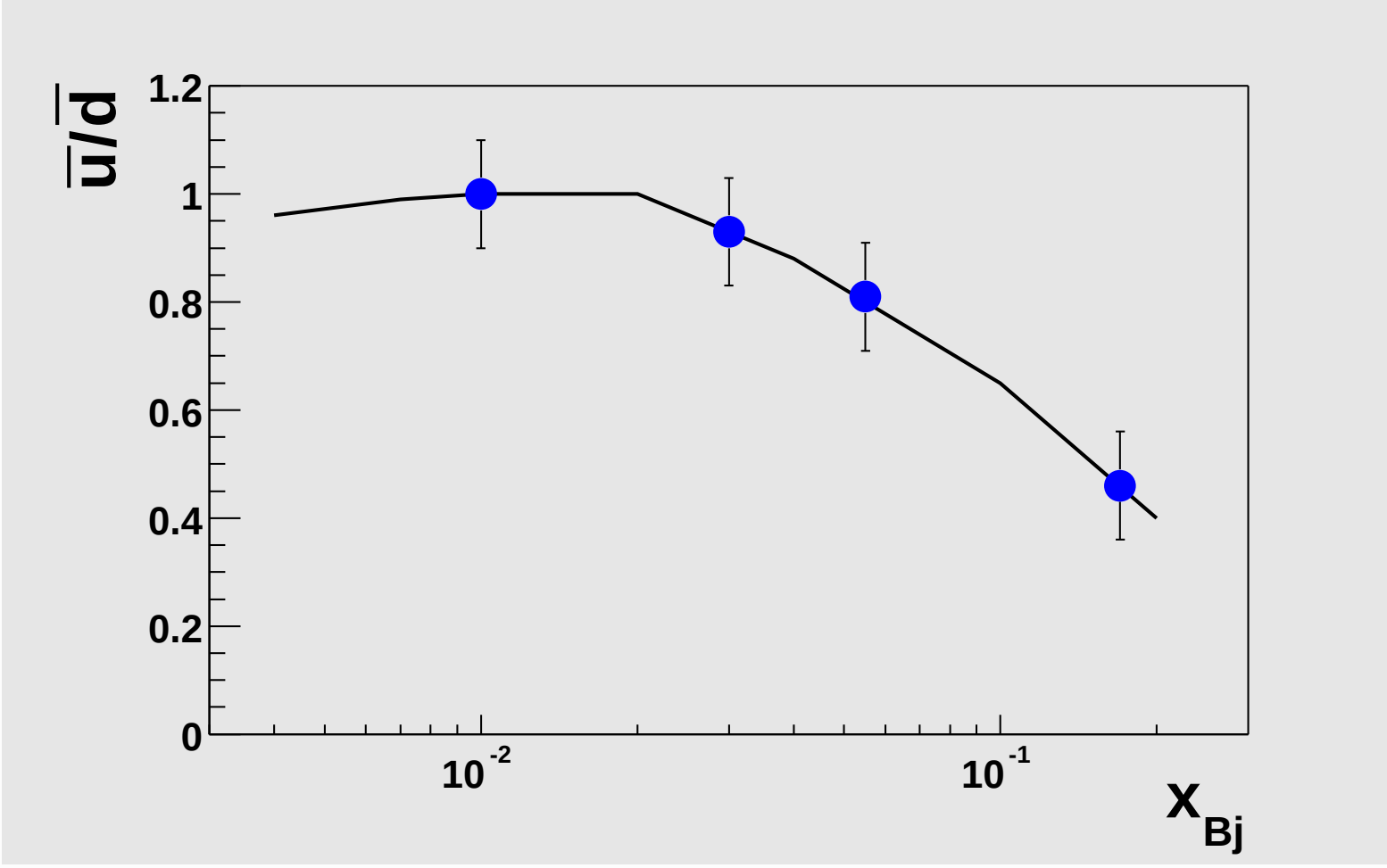
It turns out:

$$\frac{N_D^{K^{*-}} - N_D^{K^{*0}}}{N_p^{\bar{K}^{*-}} - N_p^{\bar{K}^{*0}}} = \frac{3+3\bar{u}/\bar{d}}{4\bar{u}/\bar{d}-1}$$

No FF needed!

# Estimated stat. accuracy

For one year running at COMPASS intensity:



# Fragmentation Function

Assumption

$$D_1 := D_u^{K^{*+}=u\bar{s}} \overset{cc}{=} D_{\bar{u}}^{K^{*-}=\bar{u}s} \overset{IS}{=} D_{\bar{d}}^{\bar{K}^{*0}=\bar{d}s} \overset{cc}{=} D_d^{K^{*0}=d\bar{s}}$$

$$D_2 := D_{\bar{u}}^{K^{*+}=u\bar{s}} \overset{IS}{=} D_{\bar{d}}^{K^{*-}=\bar{u}s} \overset{cc}{=} D_d^{K^{*+}=u\bar{s}} \overset{??}{=} D_{\bar{u}}^{K^{*+}=u\bar{s}} = \ldots$$

Is isospin a good symmetry?

A lot of $K^*$ come from $D$s (and $D$s come form $D^*$s):

$$D^{*+=c\bar{d}} \rightarrow D^{0=c\bar{u}} + \pi^{+=u\bar{d}} \quad \text{BR = 2/3}$$

$$\rightarrow D^{+=c\bar{d}} + \pi^0 \quad \text{BR = 1/3}$$

Isospin predicts

$$D^{*0=c\bar{u}} \rightarrow D^{+=c\bar{d}} + \pi^{-=\bar{u}d} \quad \text{BR = 2/3}$$

$$\rightarrow D^{0=c\bar{u}} + \pi^0 \quad \text{BR = 1/3}$$

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but $M(D^+) + M(\pi^-) > M(D^{*0})$. Isospin badly broken!!

# Conclusions

At the time (1995), we gave up this project and made a virtue out of necessity
(aus der Not eine Tugend machen)
deciding to use $D^0$s to measure $\Delta G$!