

Summary: Focus Group A

Production P.R. Page

Isospin filters:

$$\gamma d \rightarrow \theta^+ \Lambda$$

$$I_{\theta^+} = 0, 1$$

GRAAL

$$pp \rightarrow \theta^{++} \Lambda$$

$$I_{\theta^+} = 1$$

COSY



H. Weigel

Radial Excitations

$$\theta^+ \\ \equiv \\ \equiv_{3/2}$$

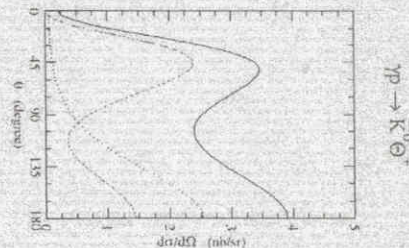
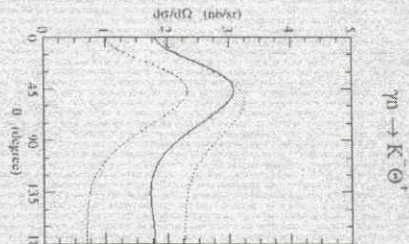
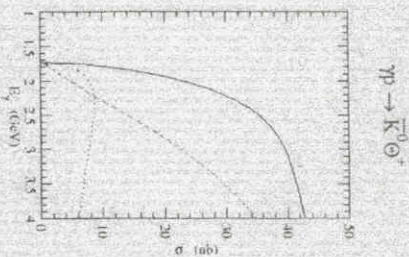
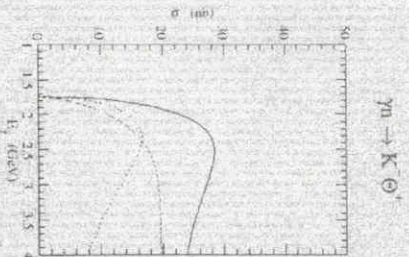
2.02 - 2.07 GeV

2.29 - 2.33 GeV

$\gamma N \mapsto K^0 \Theta$ (results)

Total cross sections

Diff. cross sections at $E_\gamma = 2.5$ GeV



Oh:

Ko: 150-200 40-150 nb

$$\begin{aligned} g_{K^*N\Theta} &= 0 \\ g_{K^*N\Theta}/g_{KN\Theta} &= 0.7 \\ g_{K^*N\Theta}/g_{KN\Theta} &= -0.7 \end{aligned}$$

Kubarovsky: 60-160 11-24 nb
 SAPHIR: 200 200 nb

$$\sigma \text{ for } I=0 \quad J=\frac{1}{2}$$

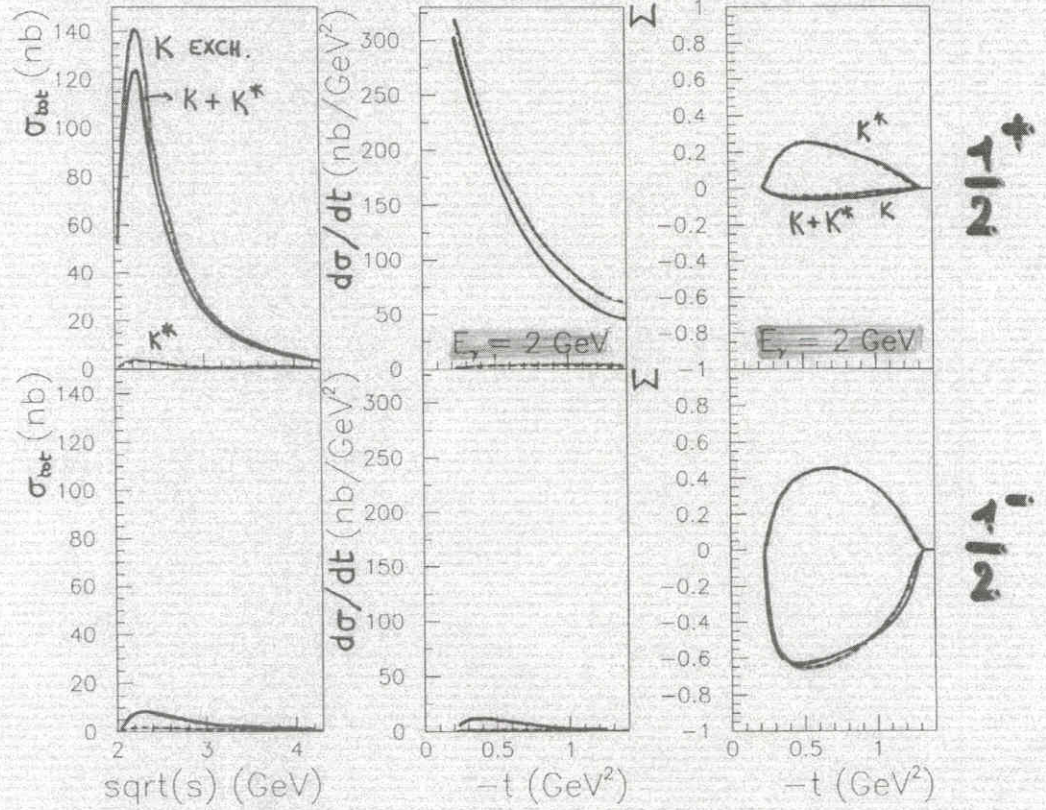
σ approx. scales as T
different authors different ansätze

Van der Haeghen :

$$\leftarrow \frac{1}{\sigma_T + \sigma_L}$$

↓

$$\theta^+ : J^P$$



\Rightarrow M. GUIDAL, M.V. POLYAKOV, M.VDH, in preparation

VDH: Regge model with only t -channel exchange
Dominated by K exchange

Model-independence of spin asymmetries

→ Essential to study, experimentally

Can be studied experimentally, with linearly polarized γ @ JLAB

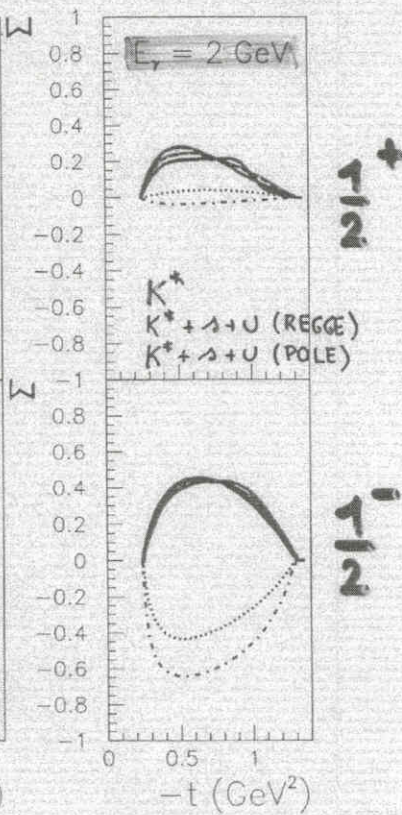
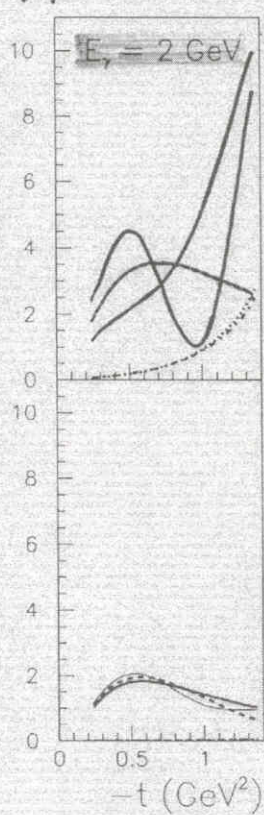
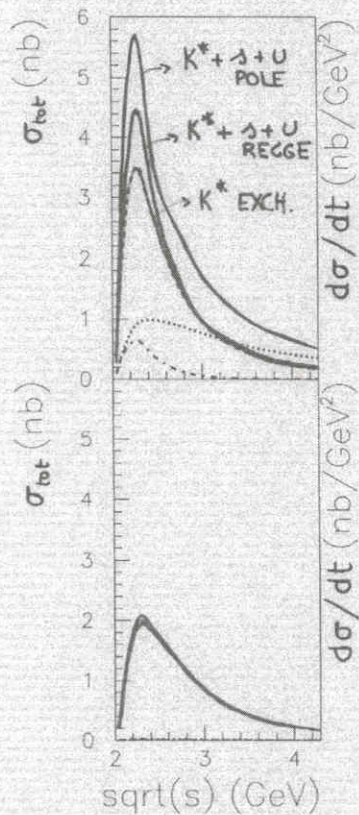
Σ asymmetry large for $\frac{1}{2}^- \Rightarrow$ Parity establishment

$K_0, 0h, VDH: \sigma$ for $\frac{1}{2}^- \ll \sigma$ for $\frac{1}{2}^+$ Factor of 7 in.

Van der Haeghen :

$$\gamma p \rightarrow \bar{K}^0 \theta^+$$

$$\theta^+ : J^P$$

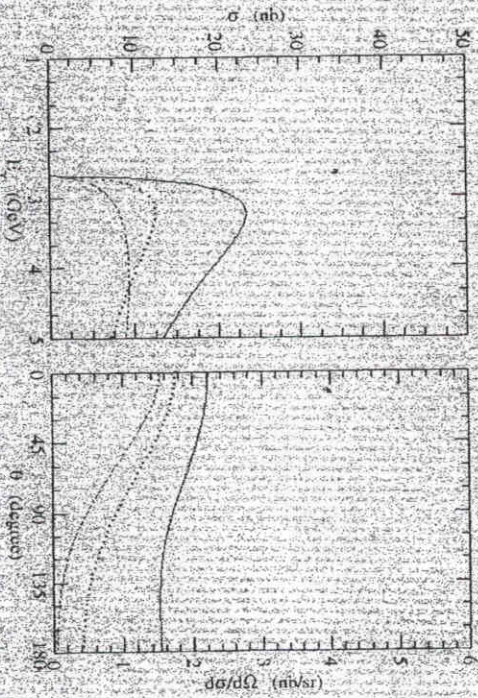


Dominated by K^* exchange



total cross section

differential cross section
 $\frac{d\sigma}{d\Omega} = \text{nb/sr}$



Dotted: $g_{K^*n} = 0$, Solid: $g_{K^*n} / g_{K^*p} = 0.7$,
Dashed: $g_{K^*n} / g_{K^*p} = -0.7$

50-110 nb

K₀ :

K_s :

Why does CLAS not see a K^* by a π in final state?

Van der Haeghen :

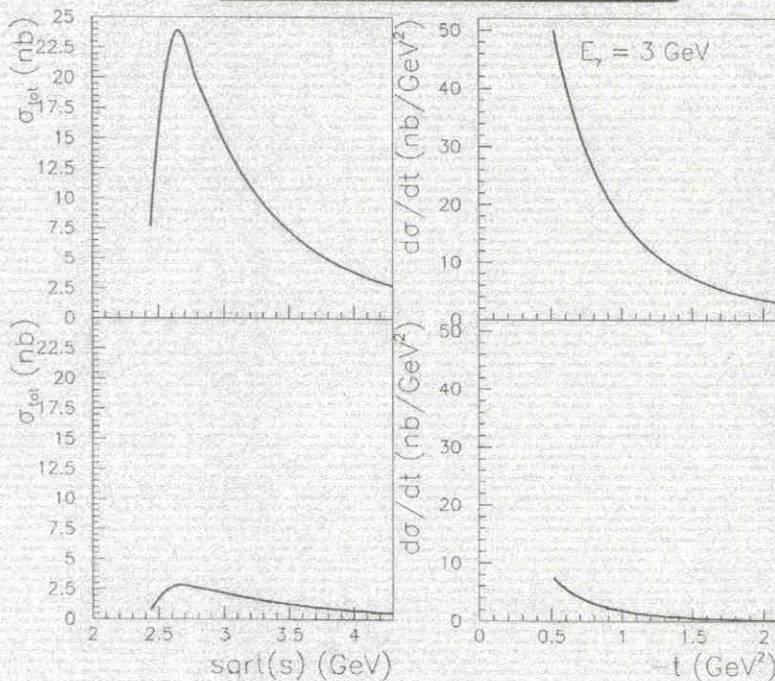
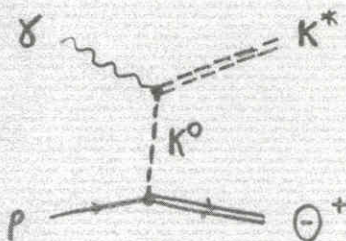
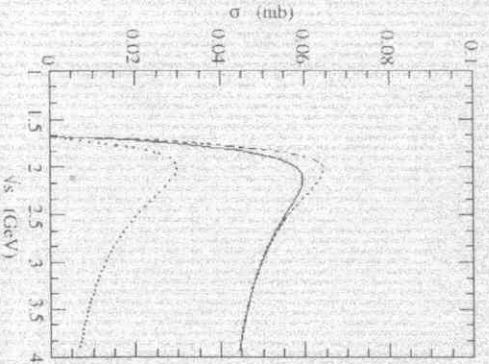

 $\Theta^+ : J^P$
 $\frac{1}{2}^+$
 $\frac{1}{2}^-$


Figure 4: Regge model predictions for the $\gamma p \rightarrow K^* \Theta^+$ reaction for both possible parities of the Θ^+ resonance. Upper panels : positive parity case; lower panels : negative parity case. The solid curves correspond with K^0 Regge exchange.

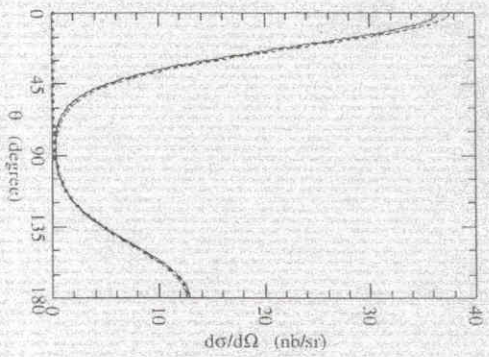




total cross section



differential cross section



- red: $g_{K^*N\Theta} = 0$
- black: $g_{K^*N\Theta} / g_{KN\Theta} = 0.7$
- blue: $g_{K^*N\Theta} / g_{KN\Theta} = -0.7$

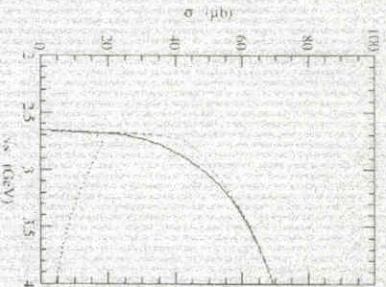
Oh:

Ko:

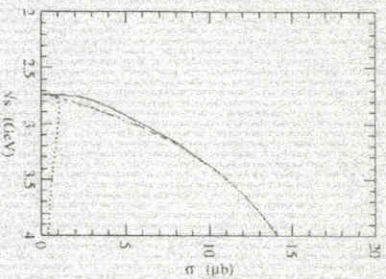
1.5 mb



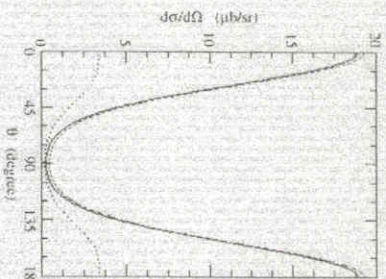
$np \rightarrow \Lambda^0 \Theta^+$



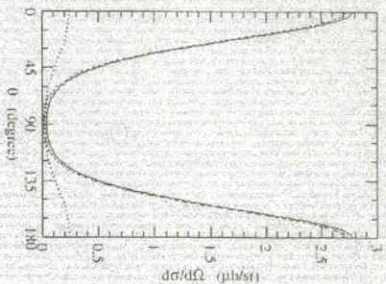
$np \rightarrow \Sigma^0 \Theta^+$



$d\tau \rightarrow \Lambda^0 \Theta^+$



$d\tau \rightarrow \Sigma^0 \Theta^+$



Oh:

red: $g_{K^*N\Theta} = 0$

black: $g_{K^*N\Theta}/g_{KN\Theta} = 0.7$

blue: $g_{K^*N\Theta}/g_{KN\Theta} = -0.7$

Caveat: Possibly more viable production mechanism proposed by myself