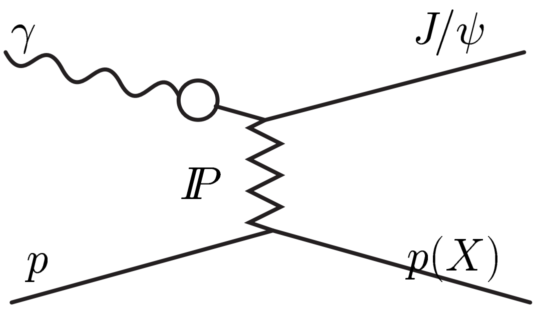
Diffractive J/ψ Production Models

In Regge theory by pomeron exchange (Donnachie, Landshoff)



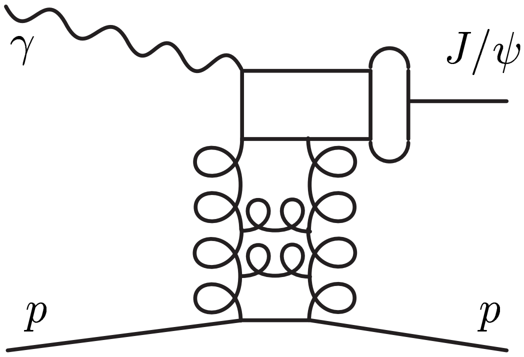
- $\sigma(W)$ slowly rising:
  $\sigma_{el} \sim (W^2_{\gamma p})^{2\varepsilon} \quad (\varepsilon = 0.08\ DL)$
- small momentum transfer $\gamma \leftrightarrow J/\psi$
  $-t = (p_\gamma - p_{J/\psi})^2 \approx p_t^2(J/\psi) < 1\,GeV^2$
- exponential t dependence of σ

$$\frac{d\sigma(W_{\gamma p})}{dt} \sim e^{-b(W_{\gamma p})t}$$

- s channel helicity conservation

$\Longrightarrow$ describes well vector meson production in $\gamma - p$ at low energy

Within pQCD approach (in LLA) by gluon ladder (Ryskin, ...)



- σ related to gluon density

$$\sigma_{el} \sim \left[\alpha_s(\bar{q}^2) \cdot \bar{x} g(\bar{x}, \bar{q}^2)\right]^2$$

with $\quad \bar{q}^2 \approx m^2_\psi/4 \approx 2.5\,\mathrm{GeV}^2$

$$\bar{x} = \frac{Q^2 + m^2_\psi - t}{W^2_{\gamma p}} \sim 5{\cdot}10^{-4} \ldots 5{\cdot}10^{-3}$$

- normalization uncertainty $\sim 30\%$

$W_{\gamma p}$ dependence of cross section is correlated with x dependence of gluon density: $\quad \sigma \sim W^{4\varepsilon} \Longrightarrow (x \cdot g(x)) \sim x^{-\varepsilon}$

$\Longrightarrow$ Access to $g(\bar{x}, \bar{q}^2)$ (strictly within model) via slope with $W_{\gamma p}$