

03.03.19

VGL Regge Model Code

Directory: /home/huberg/guridal-linux/ ← Intel Linux version

→ source code: cprog/e-eppi/
 - the code is in one large .c file with only libraries needed for vector math, integrations, etc.

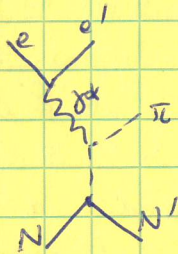
→ executable: exe/e-eppi/eN-epiN-regge
 - output files also go in this directory.

→ to make code:
 - from cprog/e-eppi directory, type
 make -f make-eN-epiN-regge

Input options:

1) Reaction (self explanatory)
 1 = (e, e' π⁻) 2 = (e, e' π⁺)

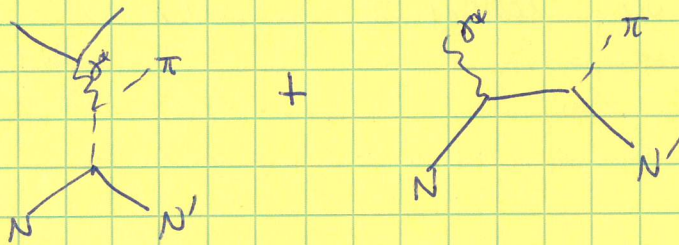
2) Forward scattering mechanism.
 1 = t-channel pion



Inclusion of this diagram by itself violates gauge invariance, so it's an option only for software checking. Do NOT USE FOR OBSERVABLES.

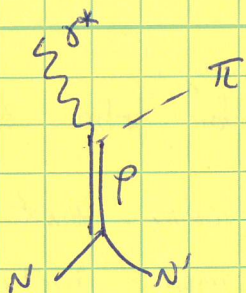
3 = pion gauge invariant.

This is the sum of the t-channel + s-channel diagrams.



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2 = rho.

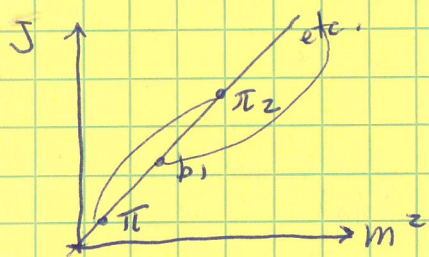


This diagram does not need an s-channel piece to be gauge invariant

4 = gauge invariant π + rho.

→ sum of all three diagrams.
THIS IS THE ONE TO USE.

3) Pion trajectory Degeneracy.



- in the Regge model (without outside constraint from quark model), the sets of states with opposite parity are distinct trajectories and there is no a-priori reason why they must overlap.
- the question, then is how to combine them.

1 = non-degenerate trajectory

- the negative parity + positive parity trajectories are treated separately.

2 = degenerate trajectory with rotating phase.

- in this case, the two trajectories are combined with a minus sign

$$(1 + e^{i\pi\alpha(t)}) - (1 - e^{i\pi\alpha(t)})$$

THIS IS THE CHOICE FOR $(\rho, \rho'\pi^+)$

3 = degenerate trajectory with non-rotating phase.

- in this case, the two trajectories are combined with a plus sign

$$(1 + e^{i\pi\alpha(t)}) + (1 - e^{i\pi\alpha(t)})$$

THIS IS THE CHOICE FOR $(\rho, \rho'\pi^-)$

IT IS IMPORTANT TO GET THESE CORRECT, FOR THESE DIFFERENT PHASES ARE WHY THE REGGE MODEL CAN PREDICT THE π^-/π^+ RATIO.

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- 4) Rho trajectory degeneracy.
- same choices for rho trajectory.

$\alpha =$ single pole means that
 $\frac{1}{t - m_\pi^2}$ is used instead of $5^{\alpha_\pi(t)}$ trajectory.

5) F_π choice (Λ_π)

1) Choose Λ_π cutoff based on fit to Bebek data.

2) Choose Λ_π based on fit to low Q^2 charge

radius data.

* 3) Input your own Λ_π

6) $\rho - \pi - \gamma$ transition form factor (Λ_ρ)

\rightarrow same options with addition of $\alpha = (\Lambda_\rho^2 = 2 \text{ GeV}^2)$.

\rightarrow Back ground for $\sigma_L \leftarrow$ added for Jochen's request.

8) Observables

\rightarrow various separated + unseparated cross-sections for either pre-defined kinematics or those you input

\rightarrow it is important to note that the output files are columns of numbers without legends

- what the columns are, and their units, are written on the screen at the time

the files are made SO KEEP TRACK OF THIS!