



Contribution ID: 74

Type: **Contributed talk**

## Understanding pion exchange in meson photoproduction from a Regge theory perspective

*Tuesday, 9 July 2024 15:00 (20 minutes)*

The GlueX experiment at Jefferson Lab aims to map the spectrum of light mesons through photoproduction, with a focus on searching for hybrid mesons, a predicted category of hadrons containing excited gluonic degrees of freedom. Achieving this goal requires a precise theoretical understanding of the underlying production mechanisms. In the GlueX energy regime, single meson photoproduction processes with a polarized photon beam are governed by the exchange of Regge trajectories in the  $t$ -channel, with unnatural parity exchanges, such as pion exchange, dominating in charge-exchange reactions at small momentum transfer. In this talk, I will explore pion photoproduction as it offers the cleanest way to study the pion exchange mechanism. However, the  $t$ -channel pion exchange process is not gauge invariant by itself, requiring consideration of the Born diagrams corresponding to the  $s$ - and  $u$ -channel nucleon exchanges. This raises the crucial question of how to properly reggeize the pion exchange amplitude. I will show that the electric term of the nucleon Born diagrams contains a “pion pole” that arises from kinematical factors and which is responsible for restoring gauge invariance of the pion exchange amplitude. I will also present a novel approach to reggeize the pion pole which considers explicitly the exchange in the  $t$ -channel of all the mesons in the pion trajectory [1].

[1] G. Montana, et al. (JPAC Collaboration) (in preparation)

### session

B. Hadron Spectroscopy

**Primary author:** MONTANA, Gloria (Jefferson Lab)

**Presenter:** MONTANA, Gloria (Jefferson Lab)

**Session Classification:** B. Hadron Spectroscopy