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TWO-PHOTON EXCHANGE EFFECTS IN MUONIC HYDROGEN

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WHY THIS MATTERS

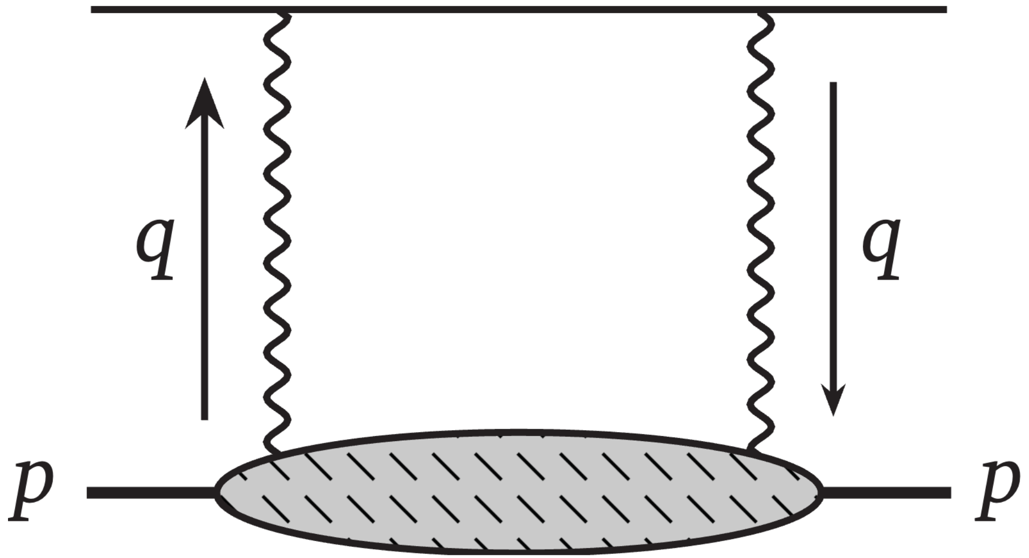
- Lamb shift of muonic hydrogen → Amplified hadronic uncertainties
- Main culprit: **two-photon exchange**
- Catch up to experiments (proposed 5-times improvement!)
- Proton structure model with the latest data
- Analytic parametrization **over the whole energy region**

Theory

Experiment

WHAT IS THERE TO DO?

Forward two-photon exchange (TPE)



- Parametrize proton structure:

$$F_1(\nu, Q^2), \;\; F_2(\nu, Q^2)$$

- Contribution of intermediate proton $\longrightarrow$ Born terms
- Contribution of intermediate hadronic resonances
- Some Non-resonant processes to consider

HOW TO DO IT

Resonant Contribution

- Consider individual nucleon resonances
- Collect exclusive data from experiments (e.g. CLAS)
- Combine for inclusive **prediction**

High Energy Regime

- Model non-resonant behaviour using physical arguments
- Consider known limits and restrictions
- **Fit** model to inclusive data in a consistent way

Resonant + Non-resonant = Total

Some details were harmed during the making of this 3-minute presentation!

If you're interested in the full-picture, come by my poster!