THEORIST'S TOOLS FOR PRECISION PHYSICS

Jort Sinninghe Damsté, *University of Amsterdam*

Nikhef Jamboree, Amsterdam, December 16-17 2019

HIGH PRECISION ERA AT THE LHC

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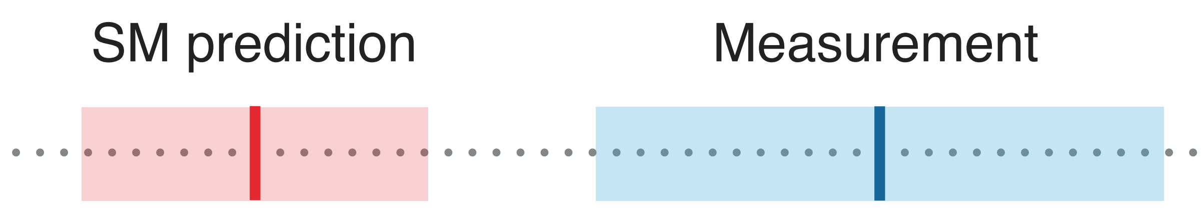

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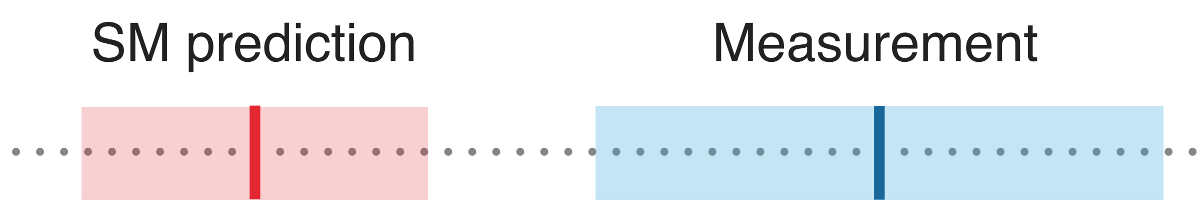

→ Obvious NP effect

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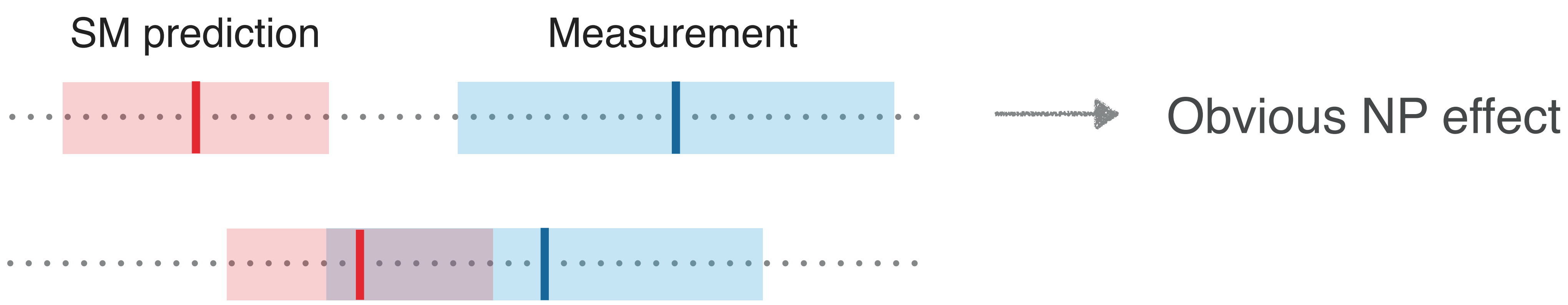

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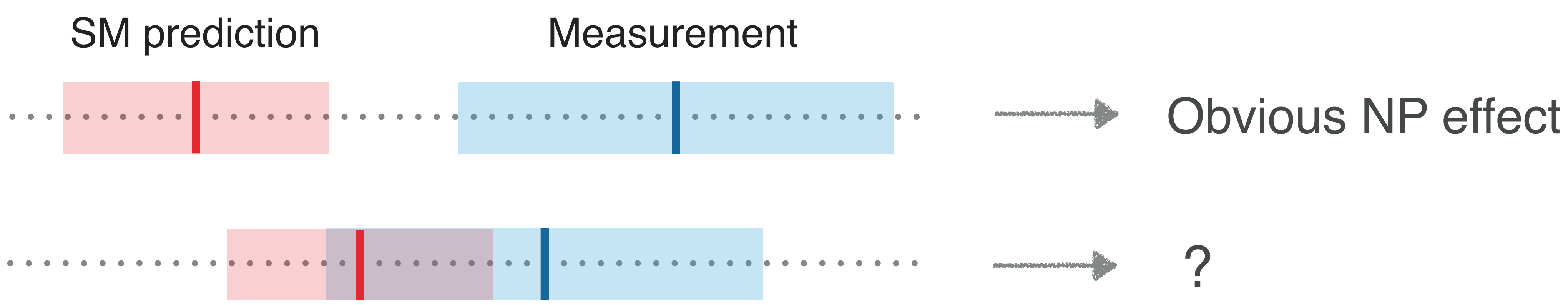

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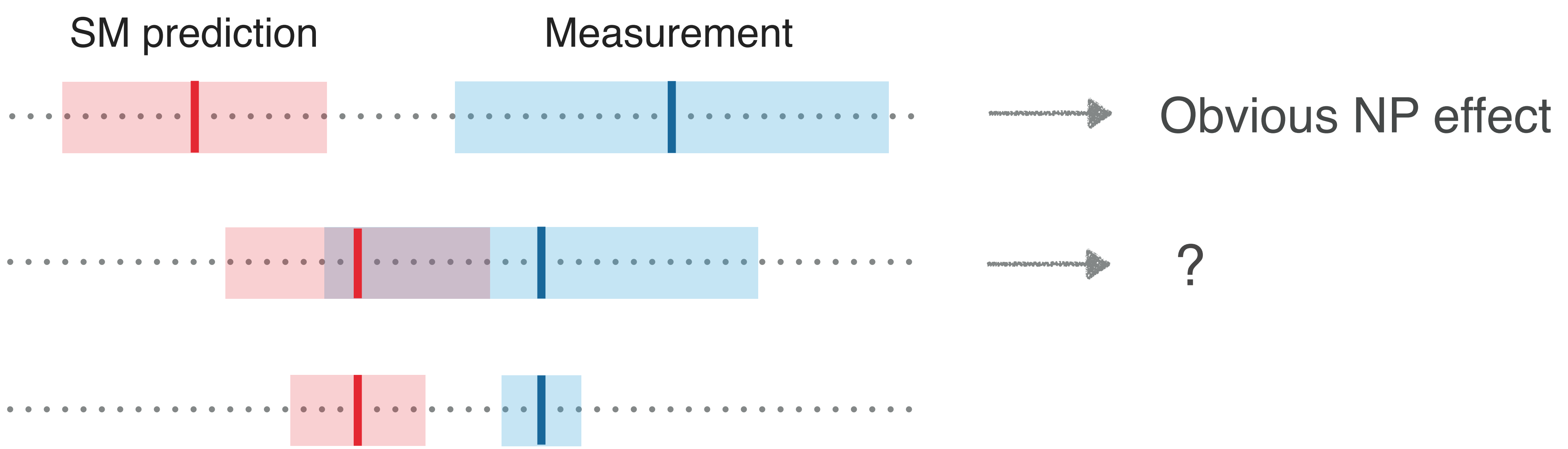

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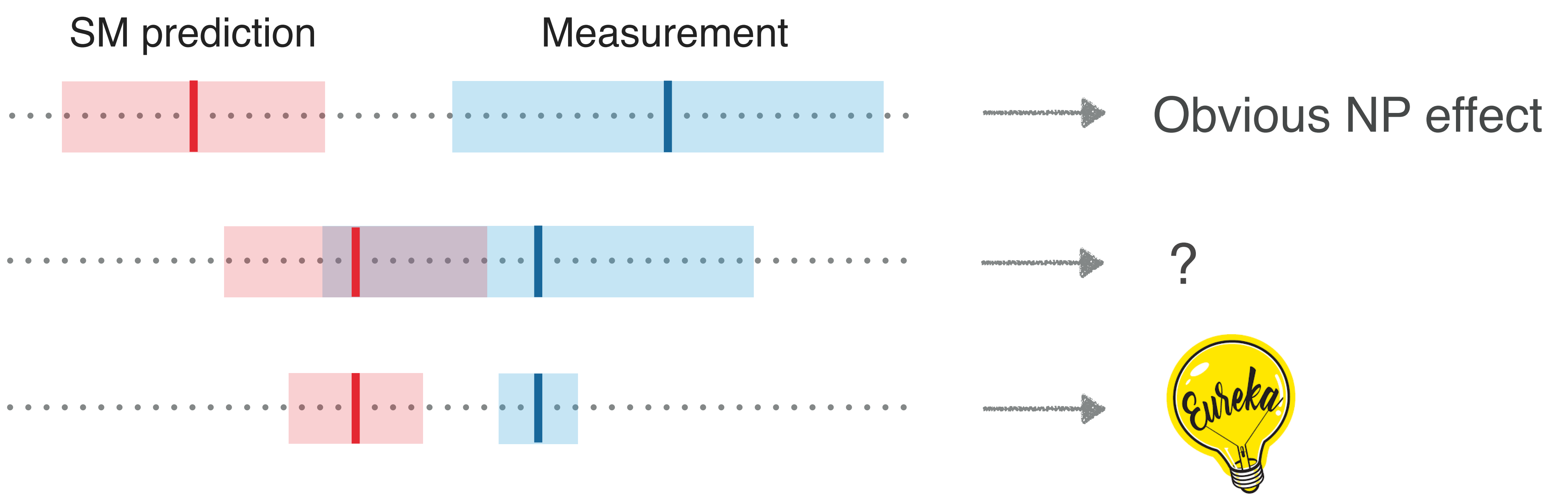

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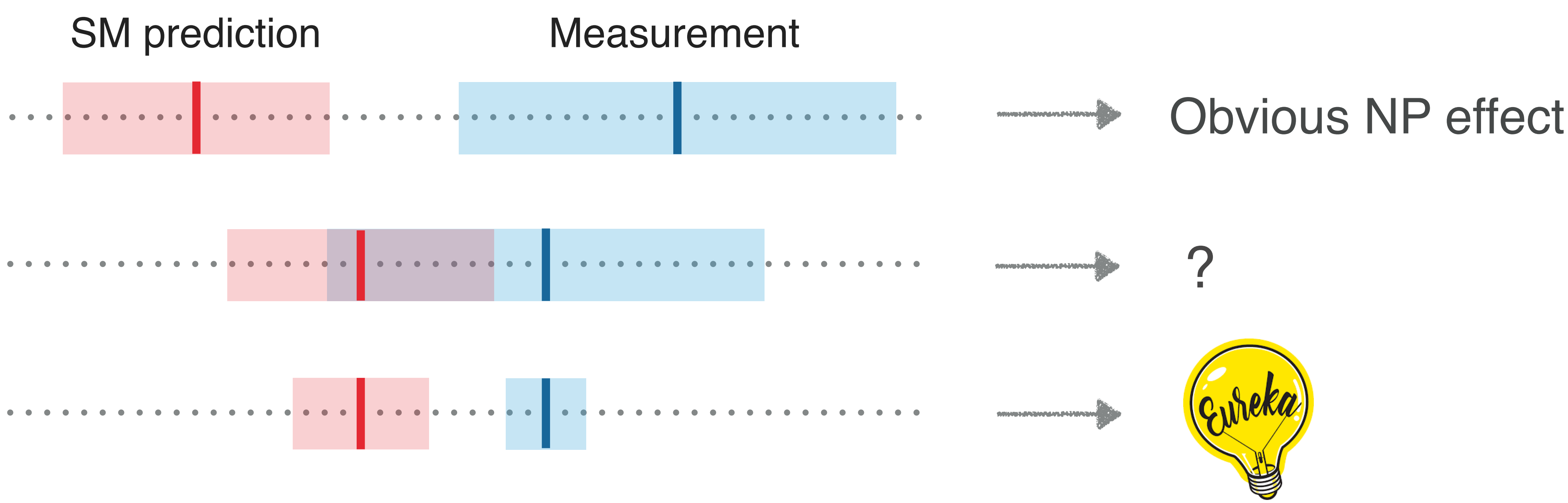

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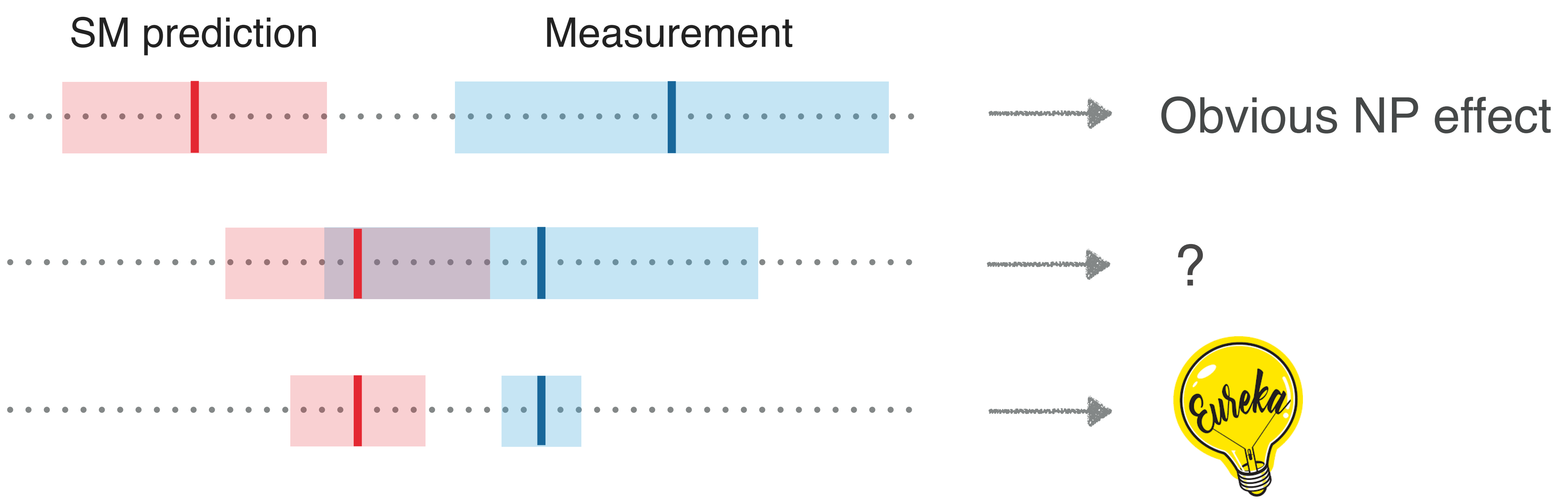

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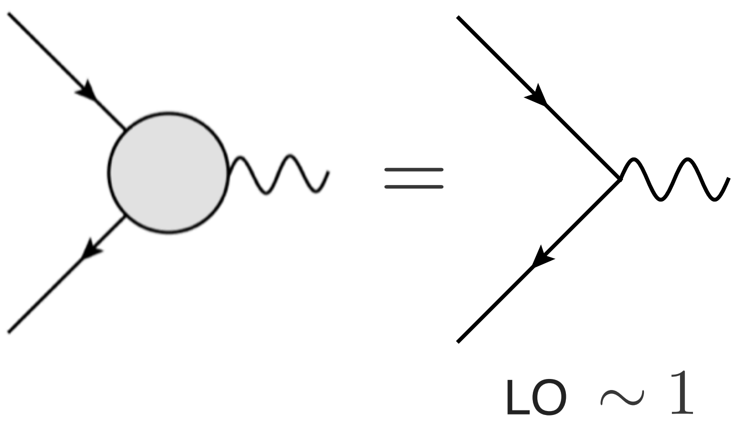
- **What are the tools at the theorist's disposal to achieve this?**

PERTURBATIVE QCD

- Our first method of choice: *perturbation theory*



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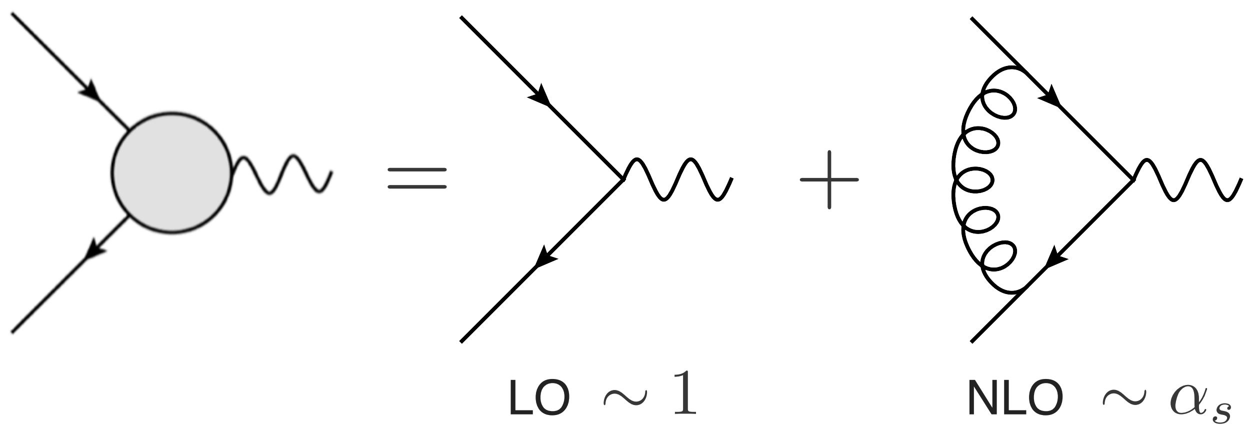

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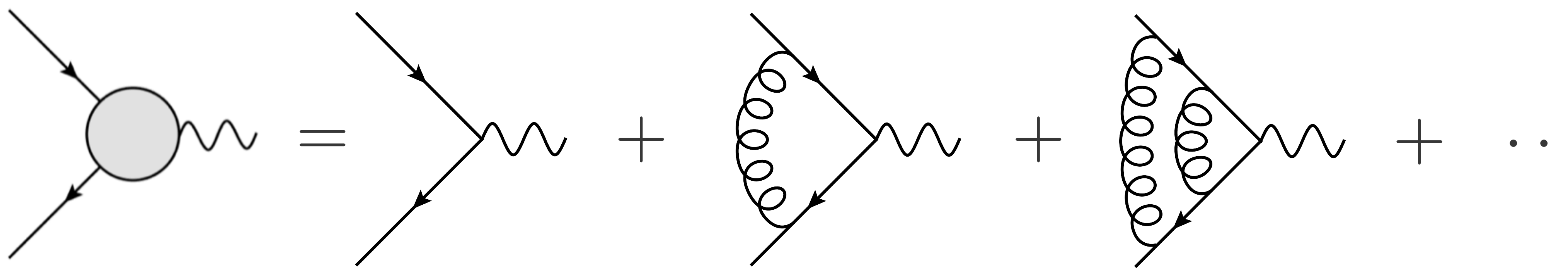

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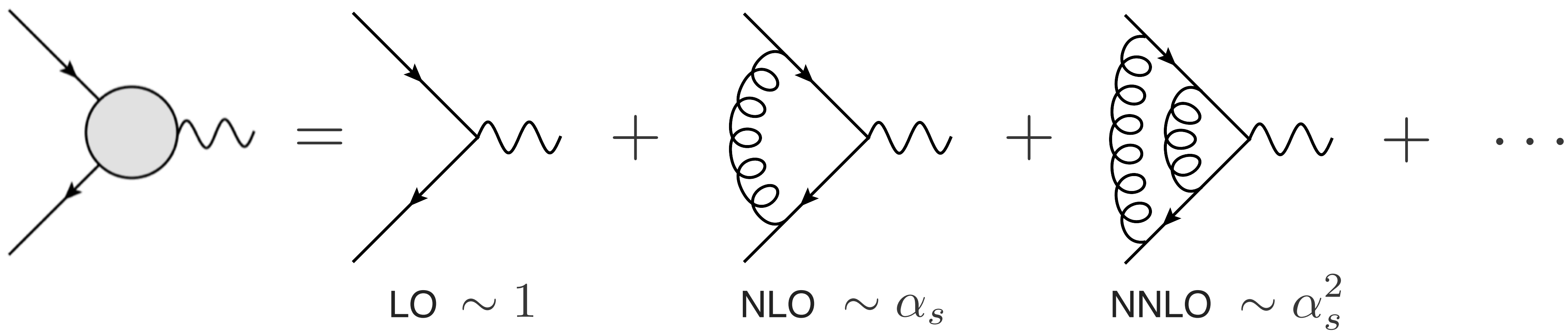

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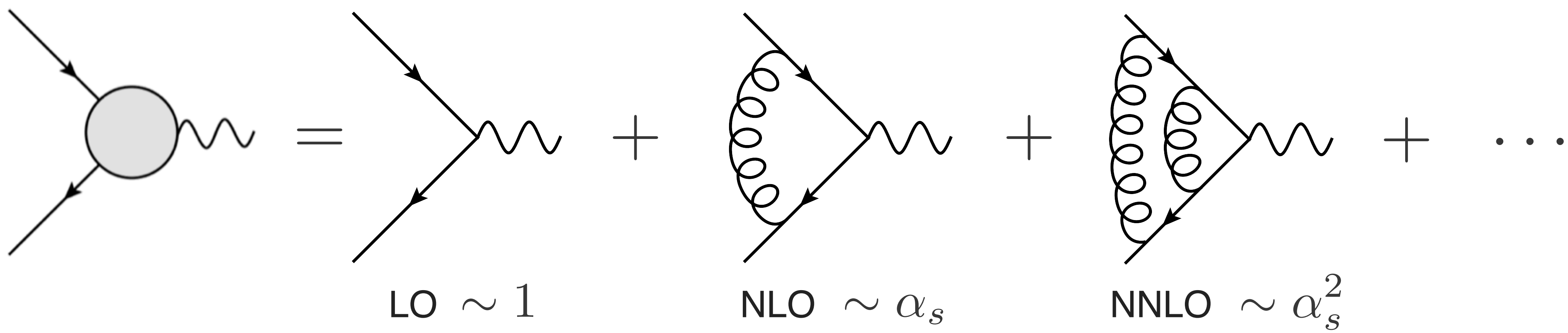

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[Anastasiou *et. al.*, 2015]

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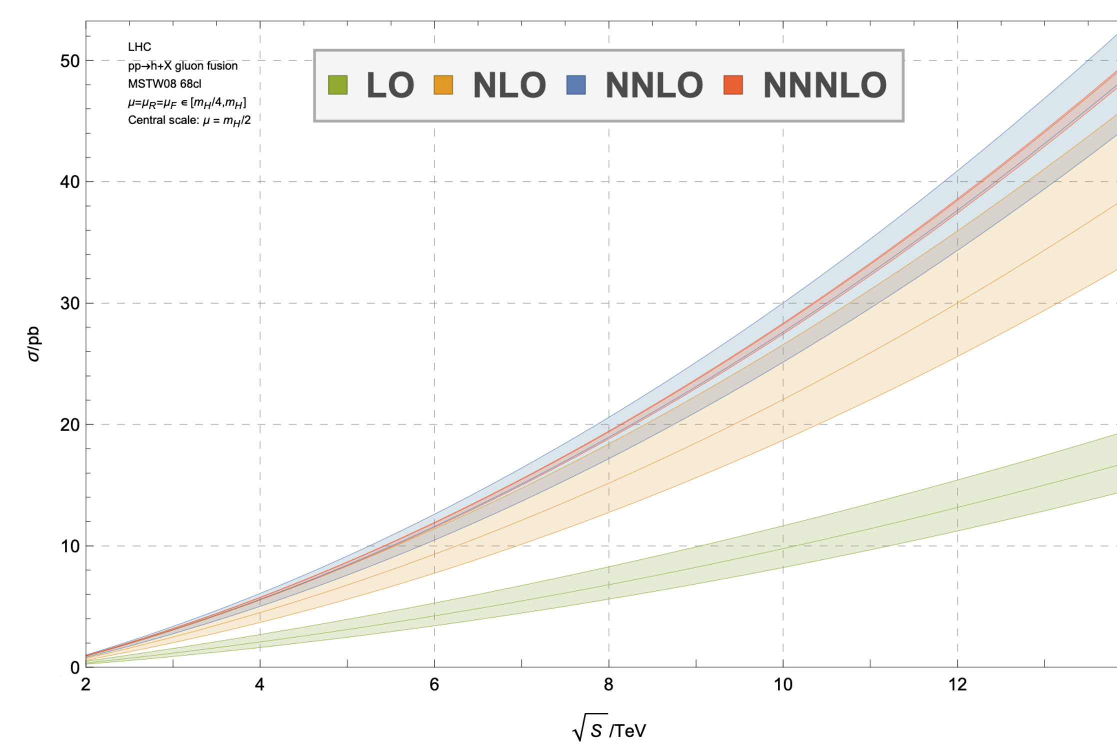

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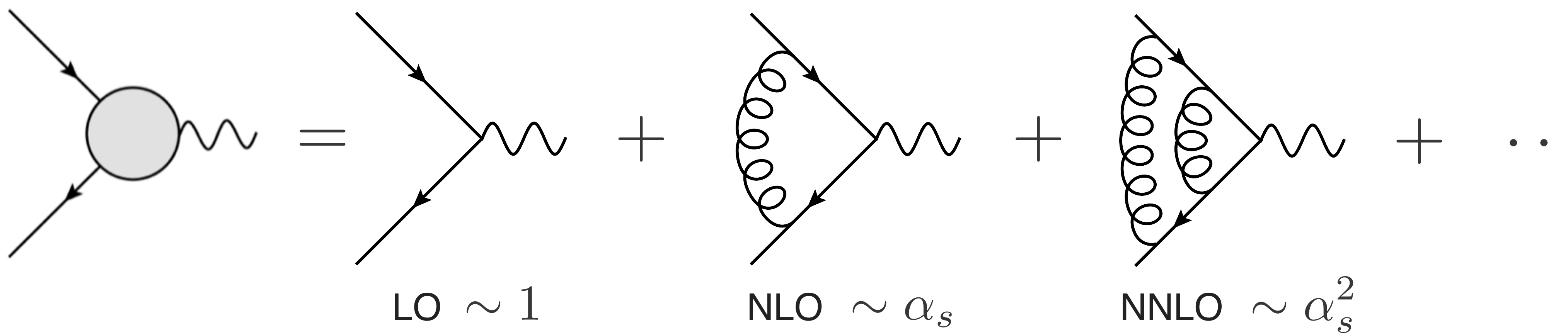

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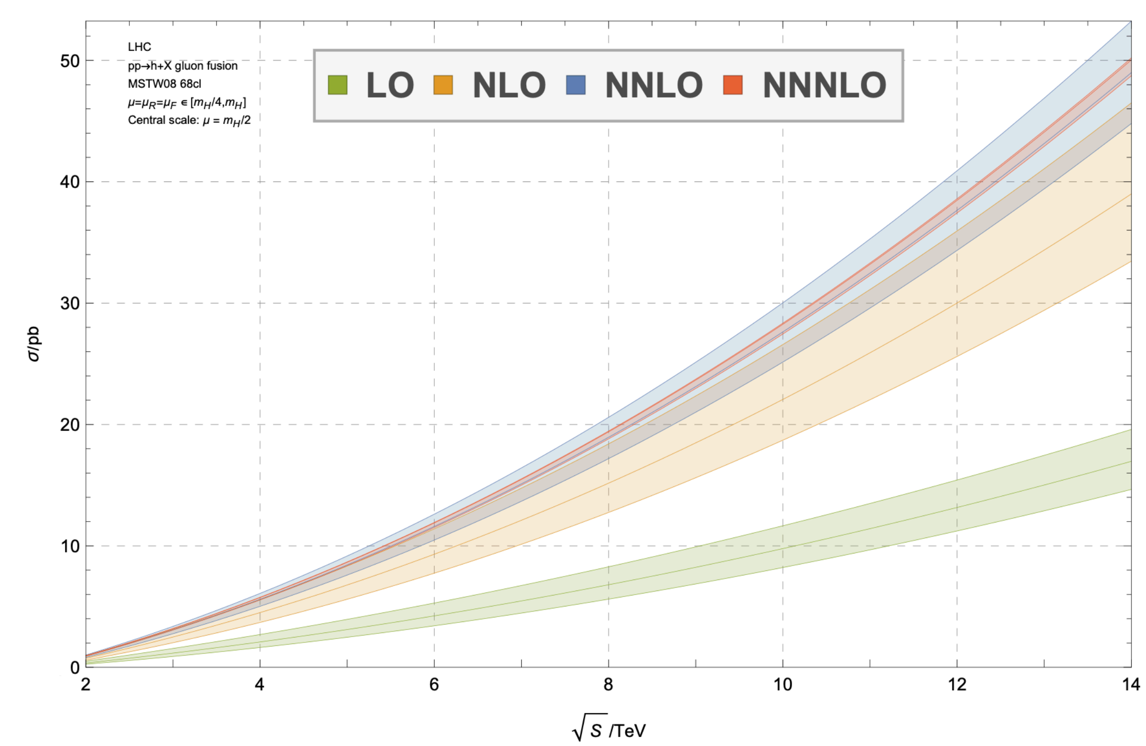

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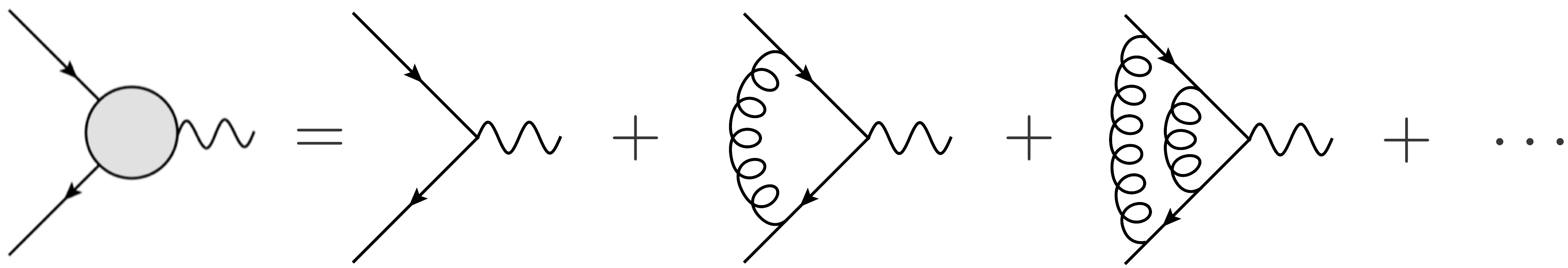

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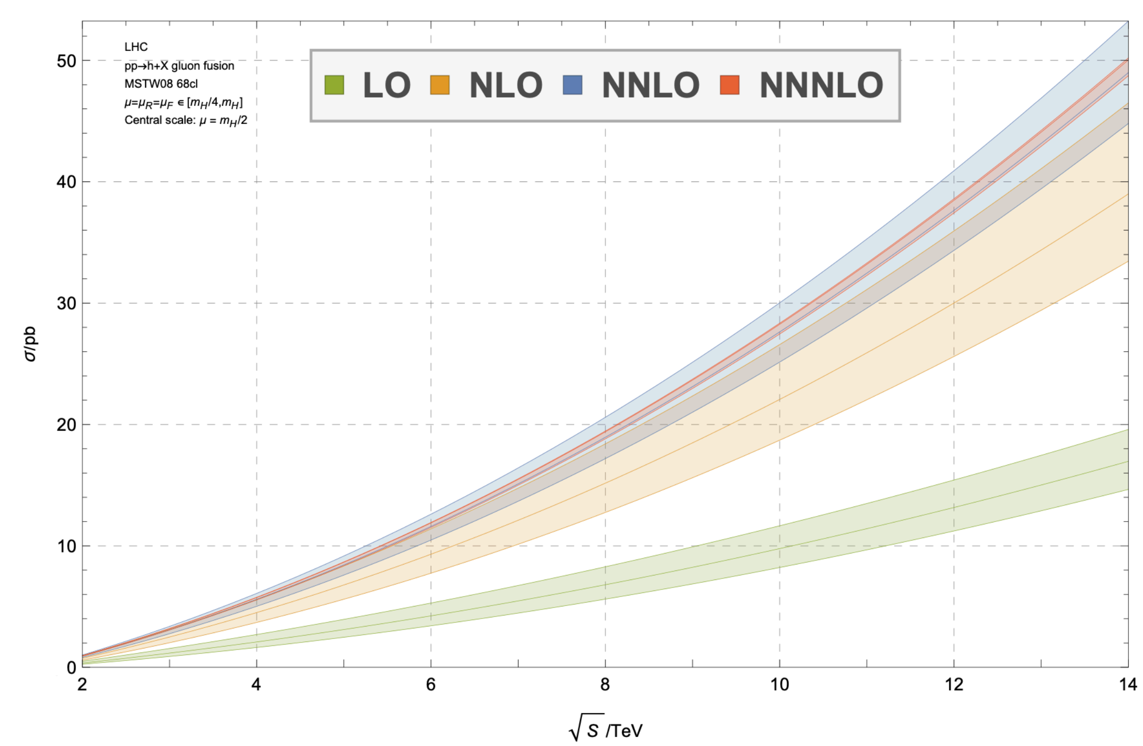

- **Example:** single Higgs production
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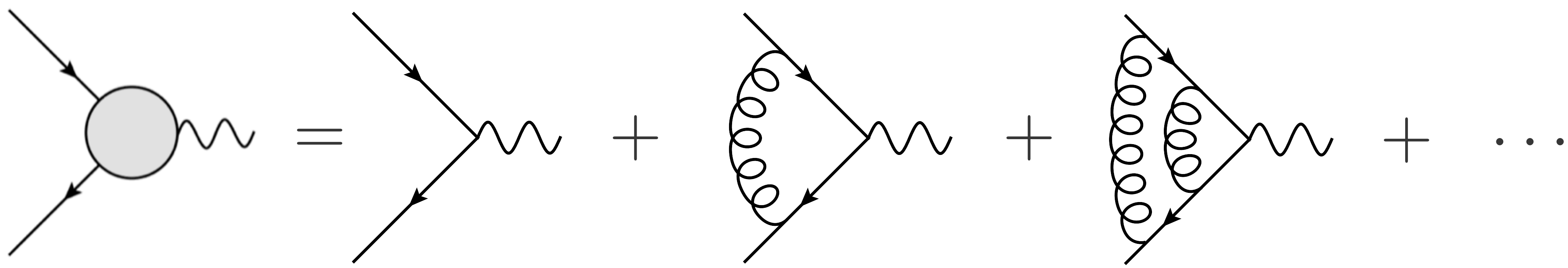
  2. Very precise prediction at N3LO

LOGS LOOMING LARGE

- Higher order corrections contain *logarithmic* terms



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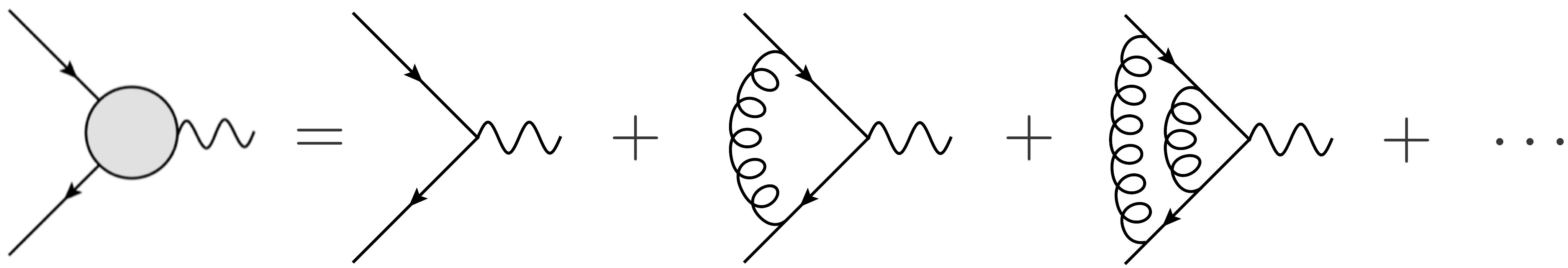

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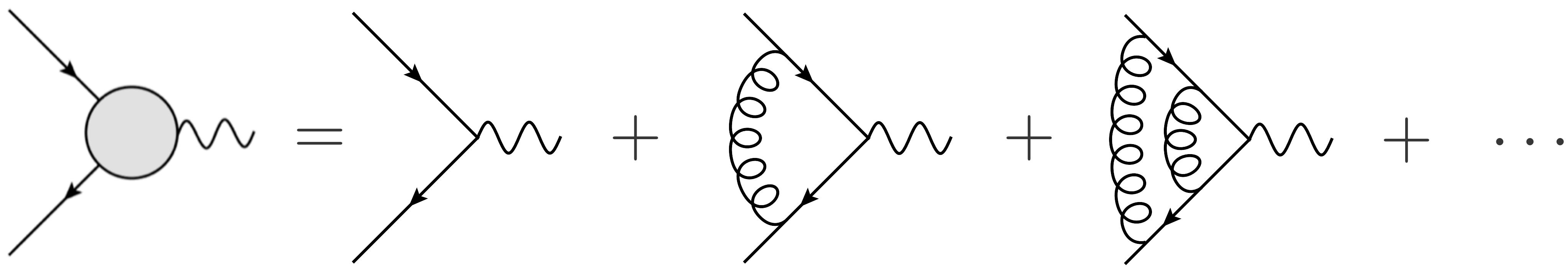

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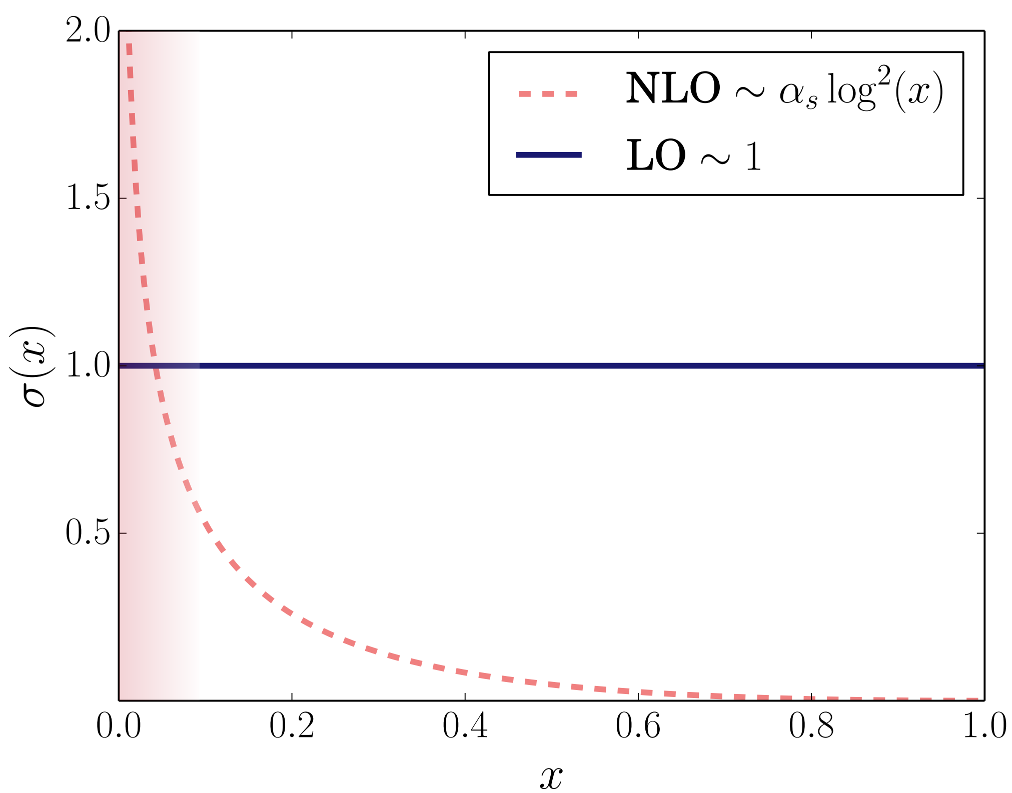

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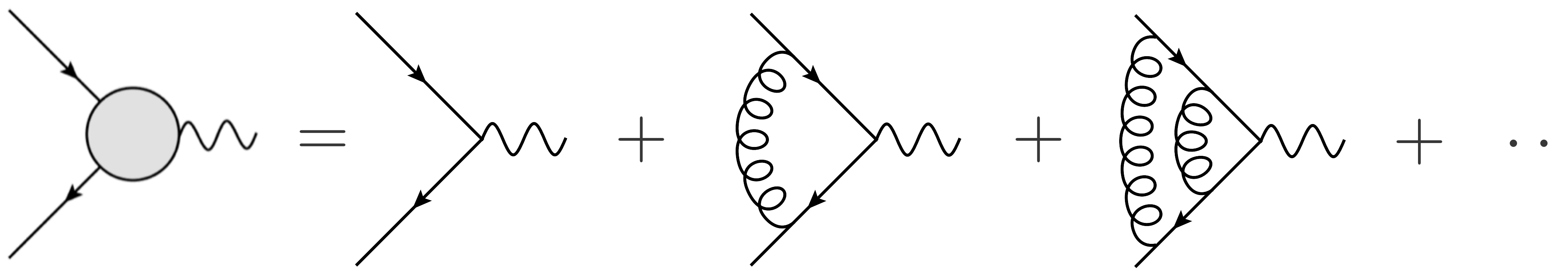

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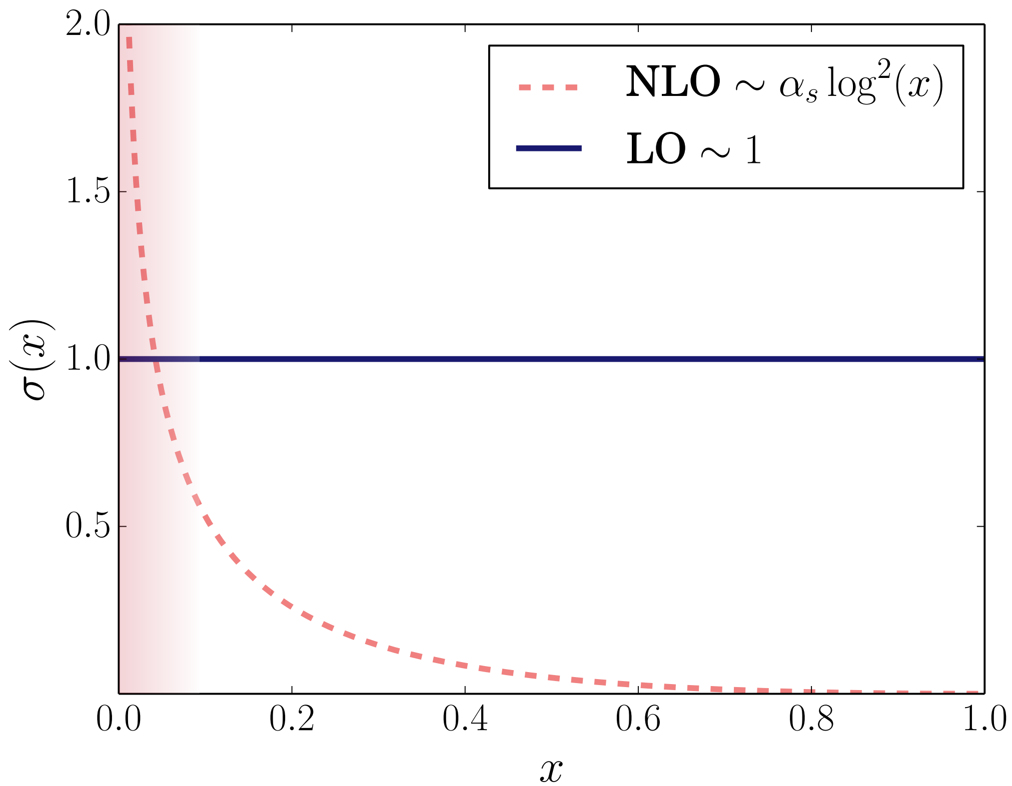

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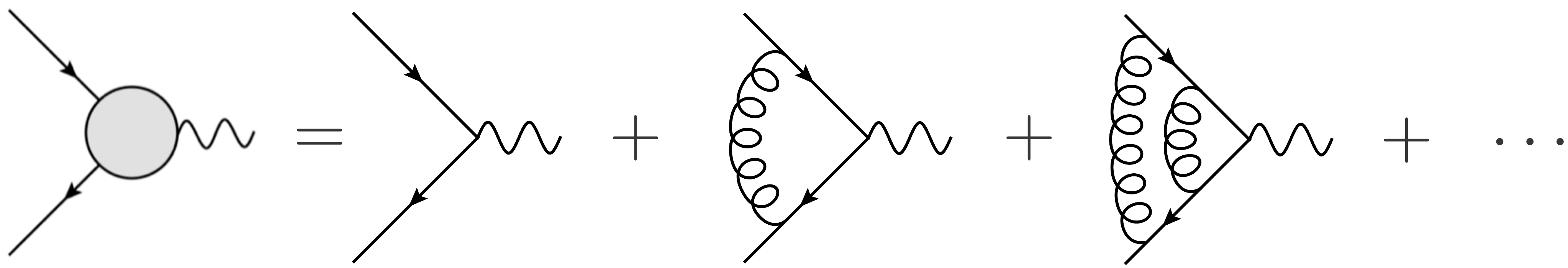

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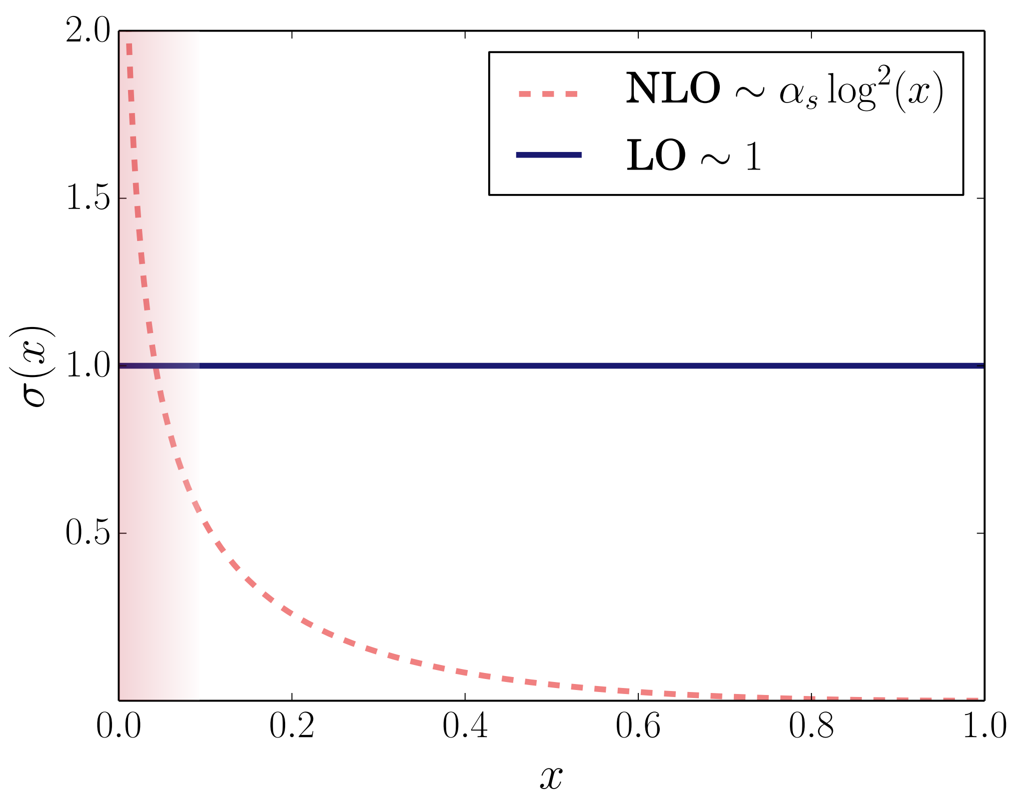

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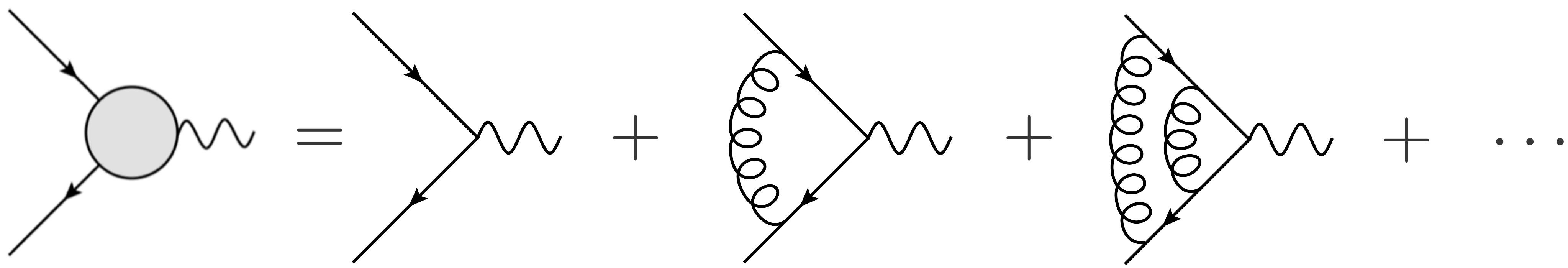

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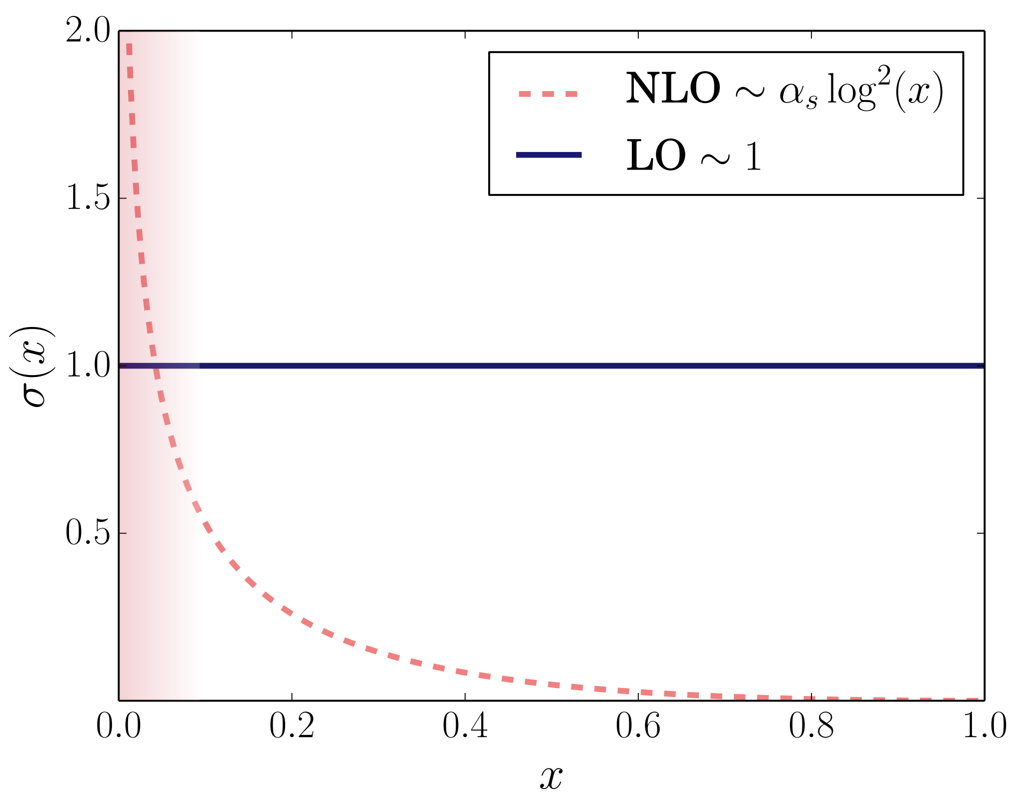

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- **How do these logarithms appear?**

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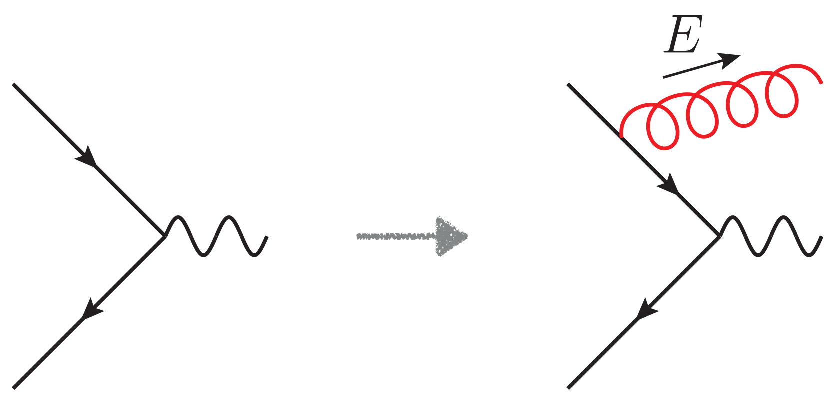

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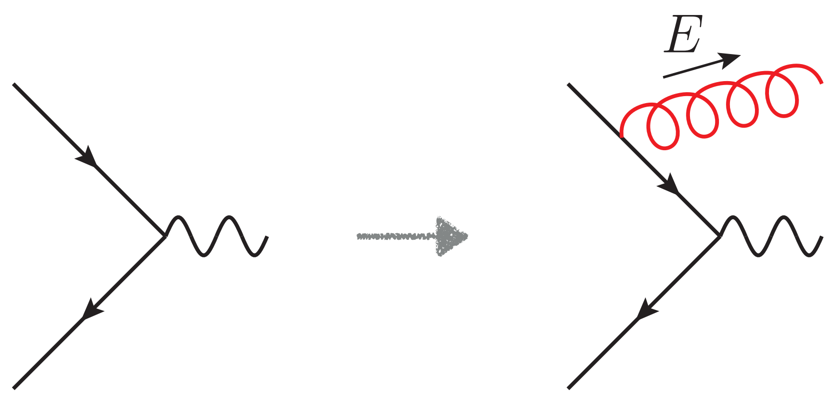

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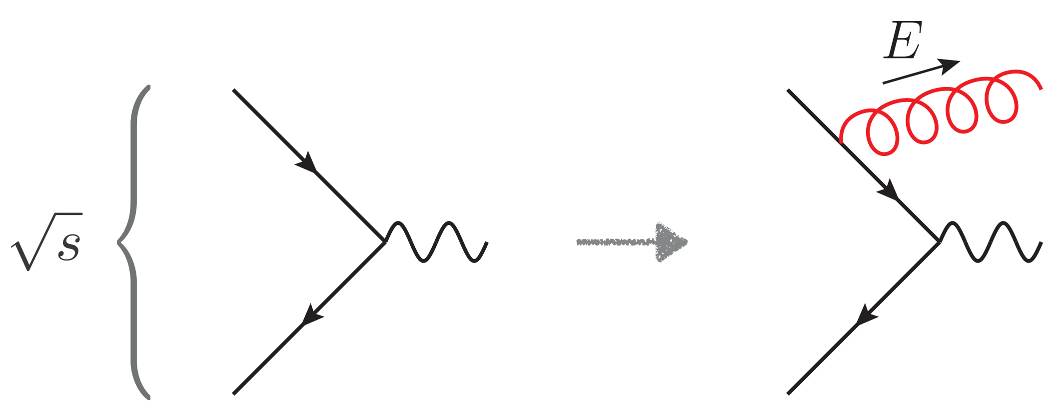

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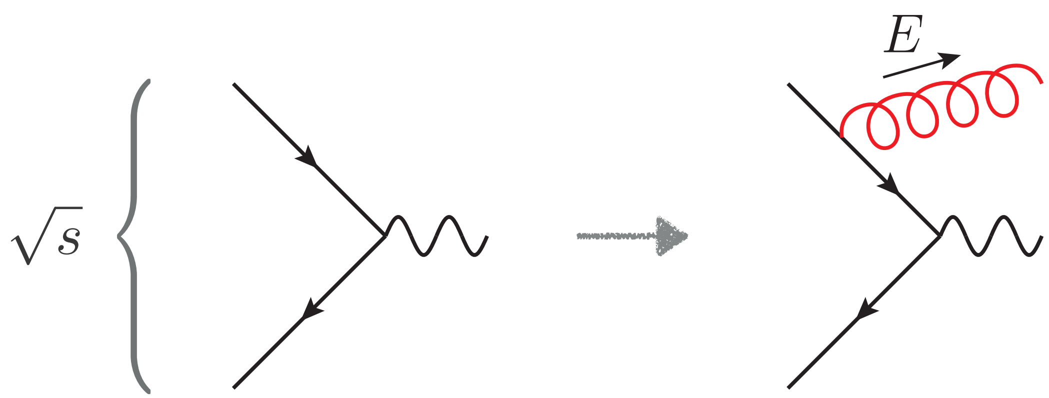

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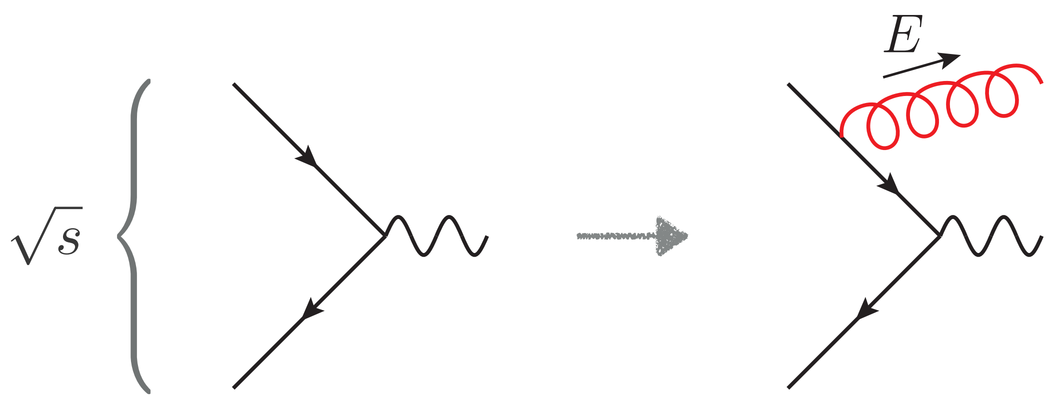

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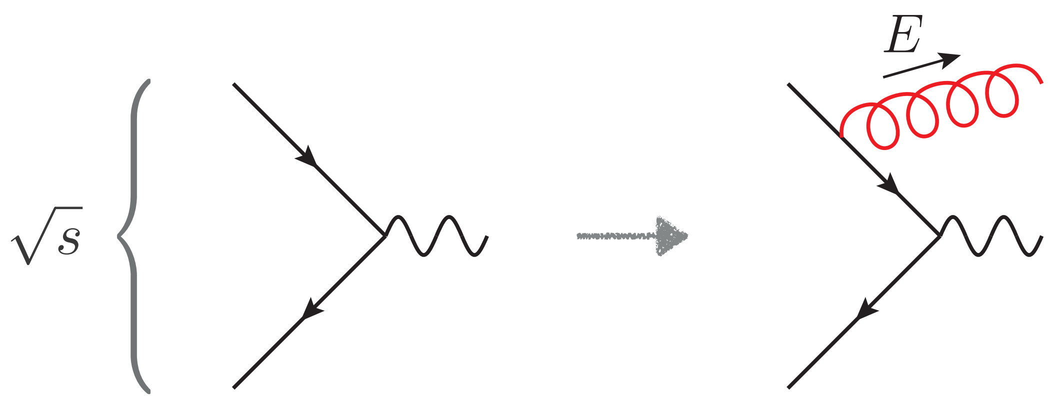

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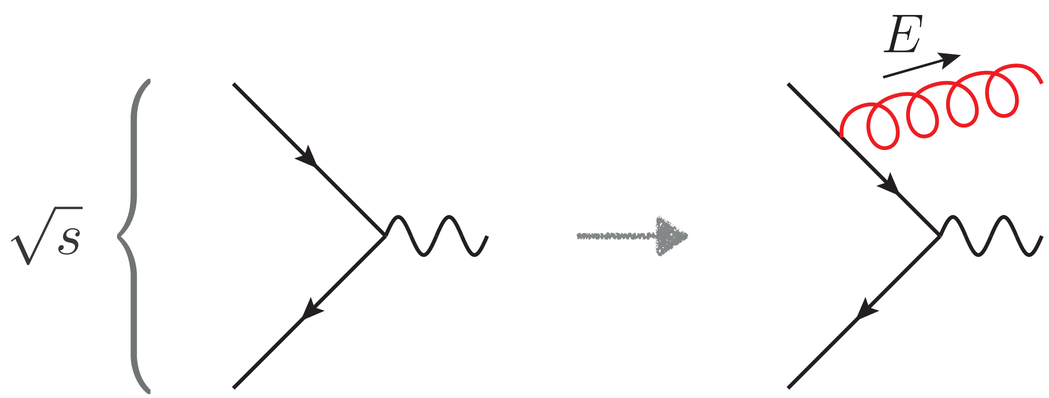

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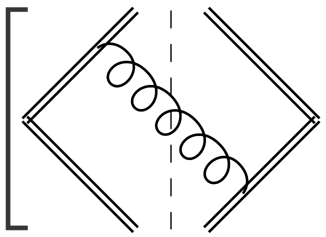
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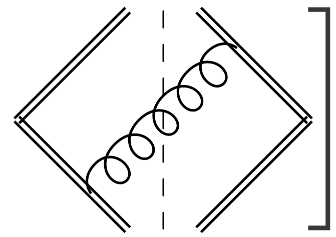
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[N. Bahjat-Abbas, D. Bonocore, JSD, E. Laenen, L. Magnea, L. Vernazza, C.D. White; JHEP 11 (2019) 002]

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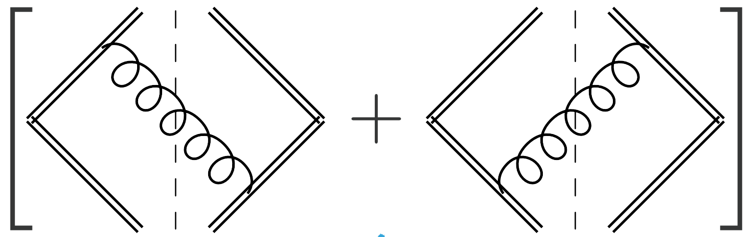

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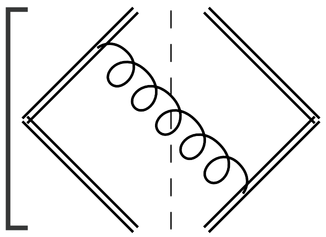

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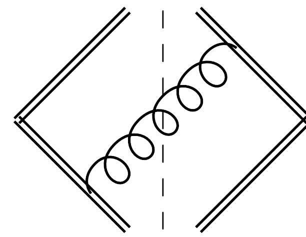

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NLP term through “kinematic shift”

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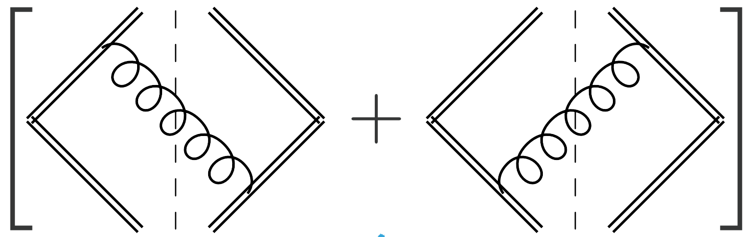
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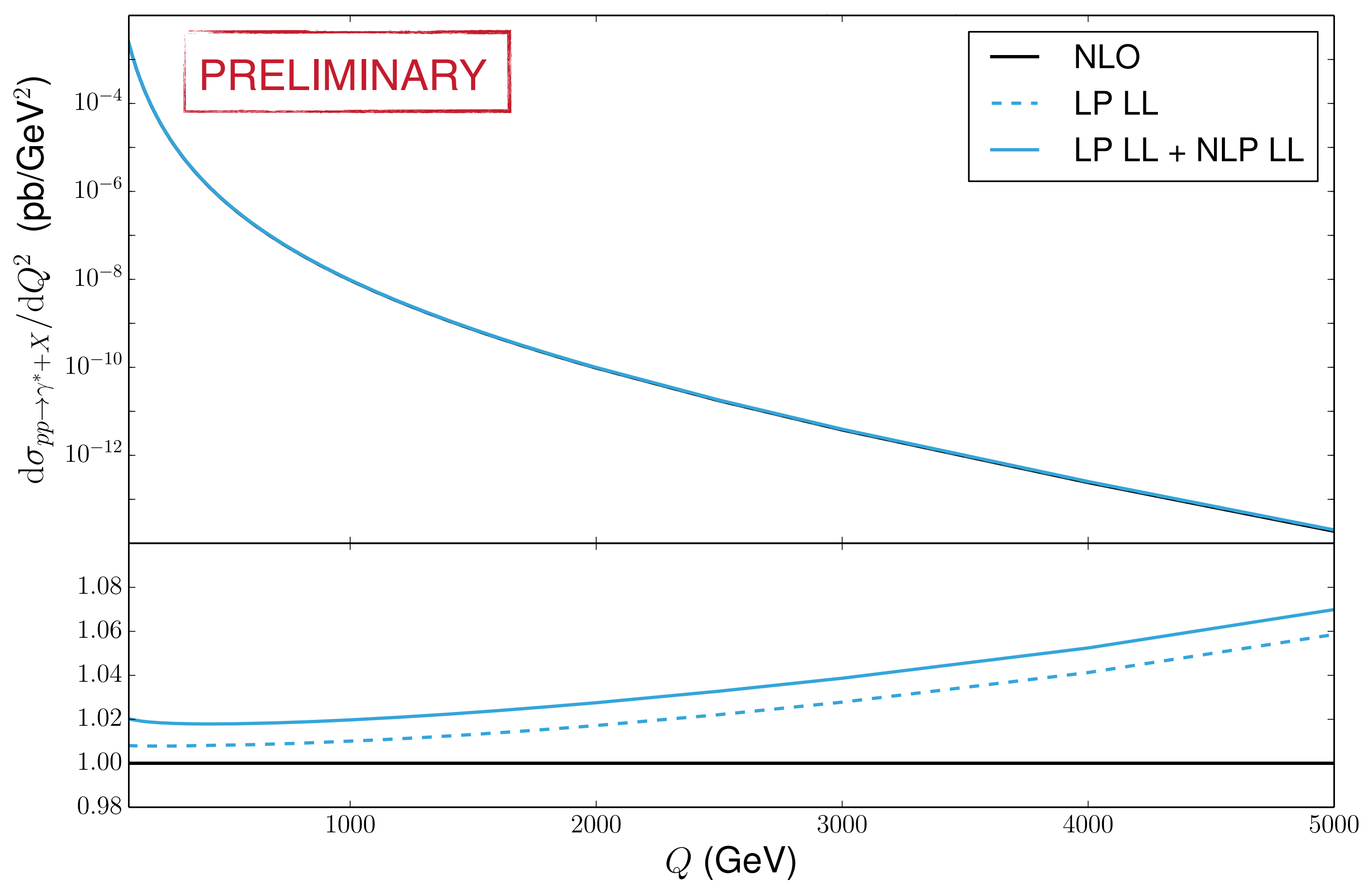

[M. van Beekveld, E. Laenen, L.Vernazza, JSD; in preparation]

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