3-jet power corrections in strong-coupling fits

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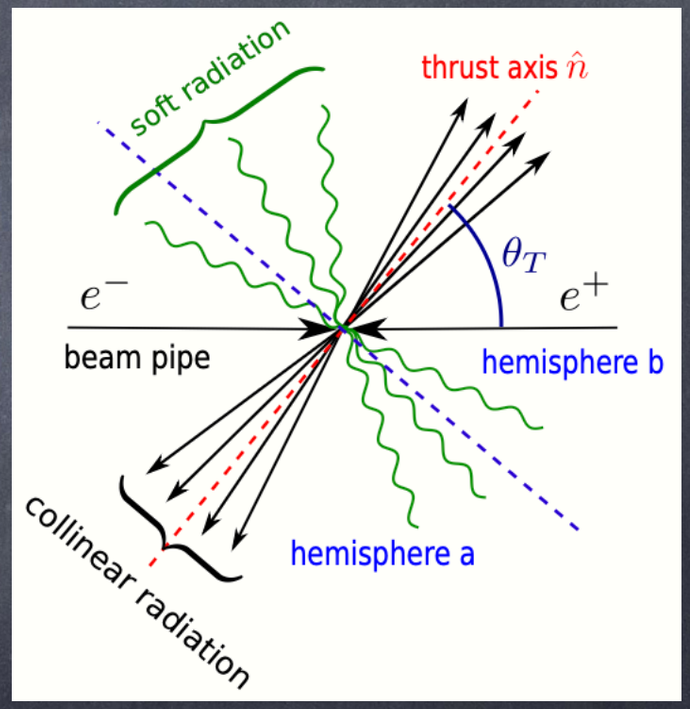
Taskforce M. Benitez, A.H. Hoang, I.W. Stewart and G. Vita based on JHEP 07 (2025) 249



Strong coupling from thrust at lepton colliders (CERN)

November 26, 2025

Introduction

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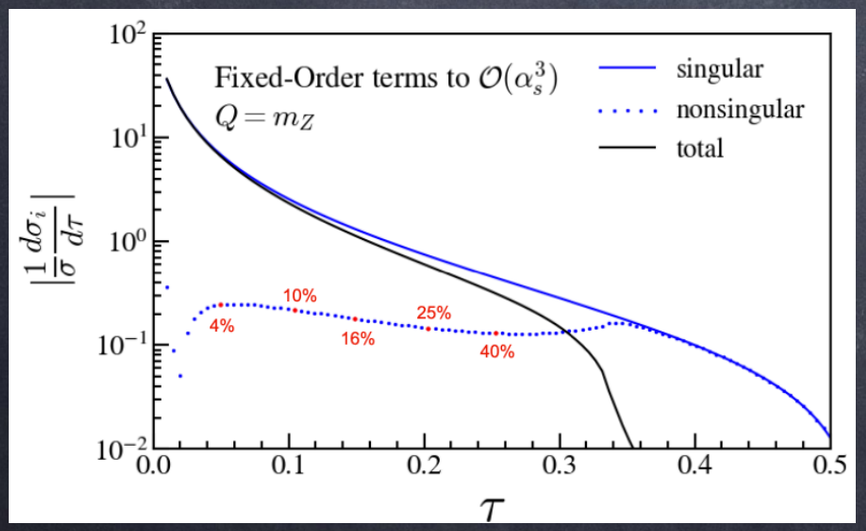

A LOT in large part of the spectrum

Same factorisation theorem accounts for perturbative and non-perturbative dynamics: common validity region

$$\mathrm{d}\sigma_2 = H_2 \times J_q^2 \otimes S_2 \otimes F_2$$

PCs in shape function

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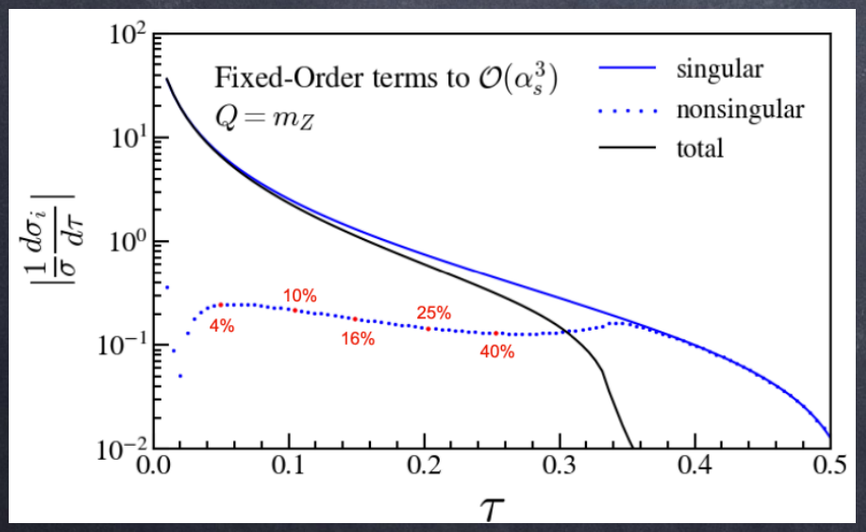

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No ab-initio result exists for transition power corrections

Computing 3-jet power corrections

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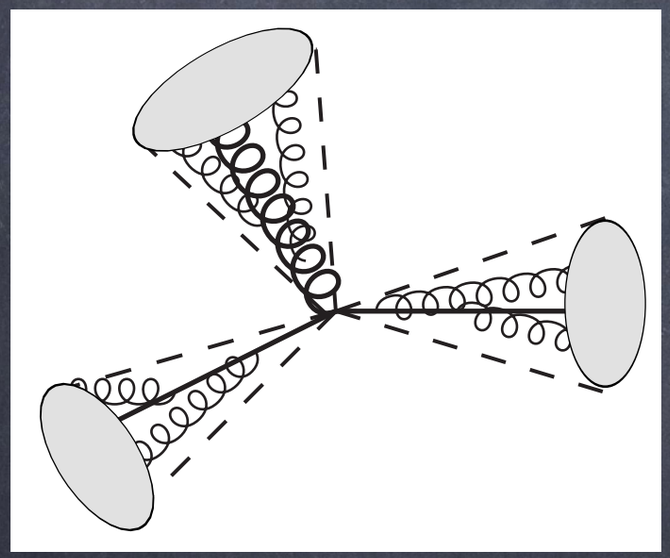

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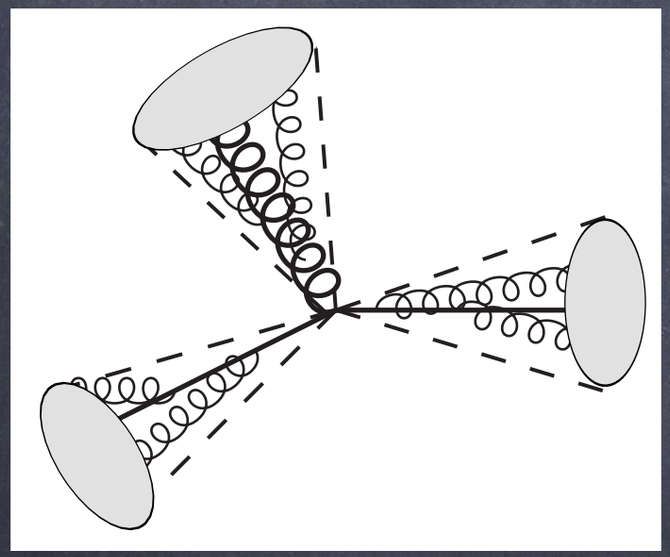
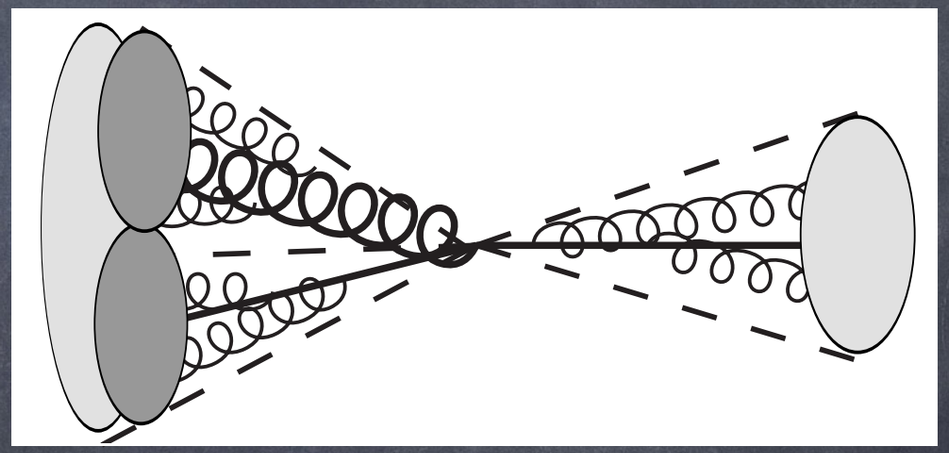


not resolvable, small τ



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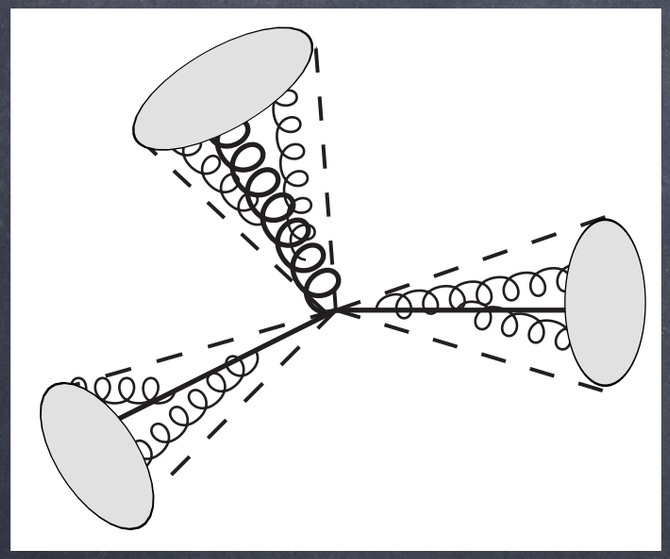

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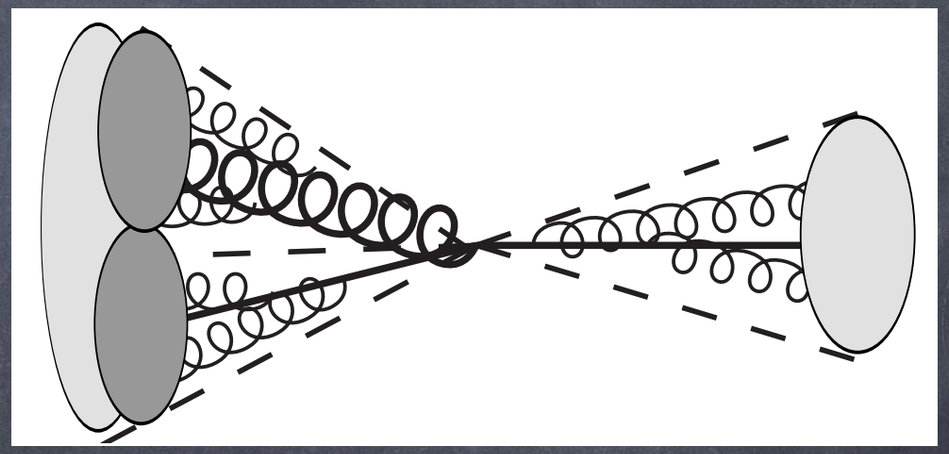
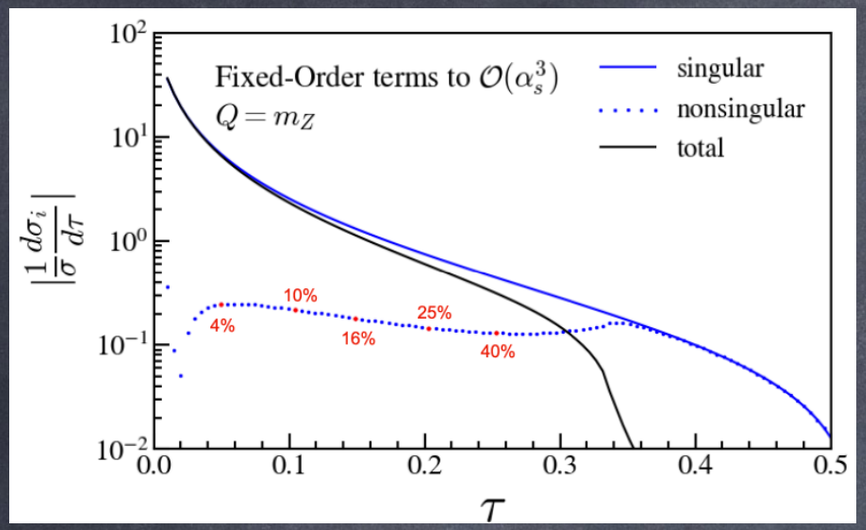
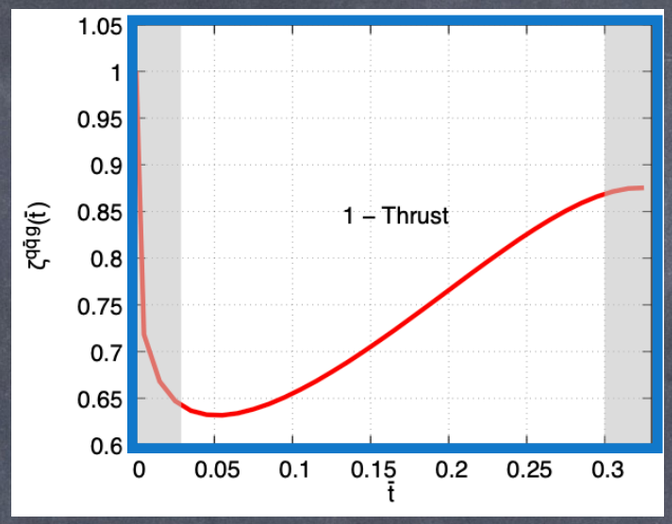


So far, no ab-initio result exists for transition region

Only results based on renormalon model

Effects on fits





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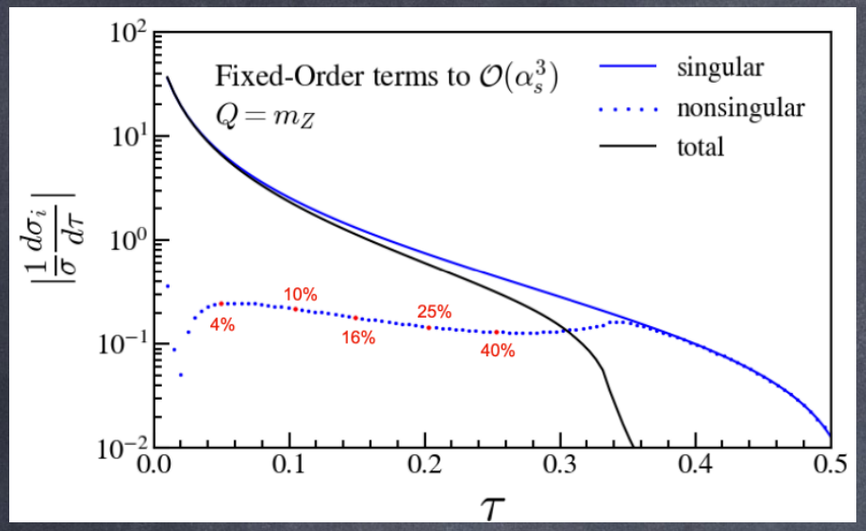
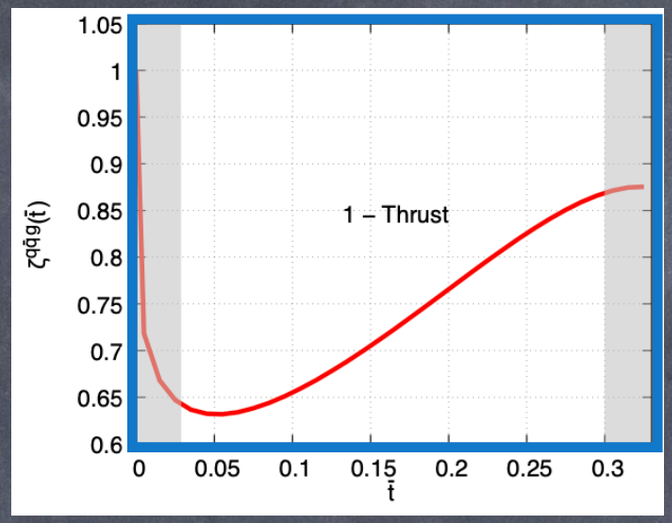
Effects on fits





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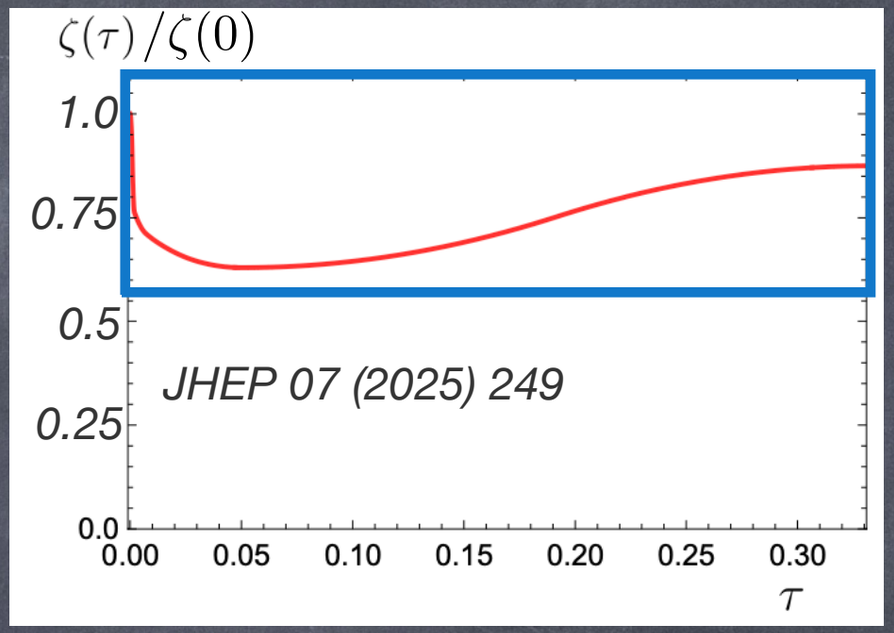

Rather flat when zoom out

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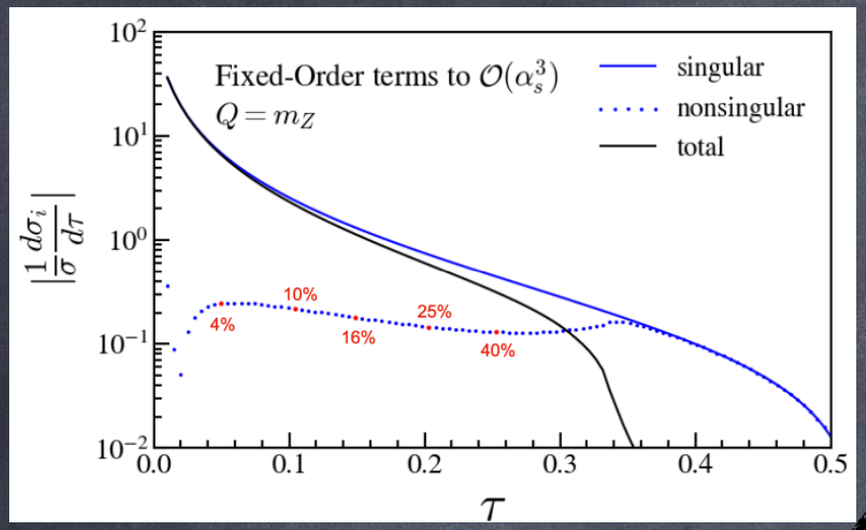

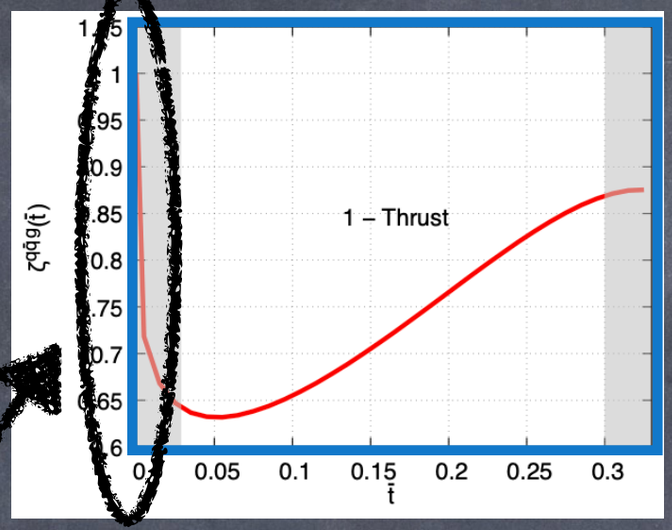

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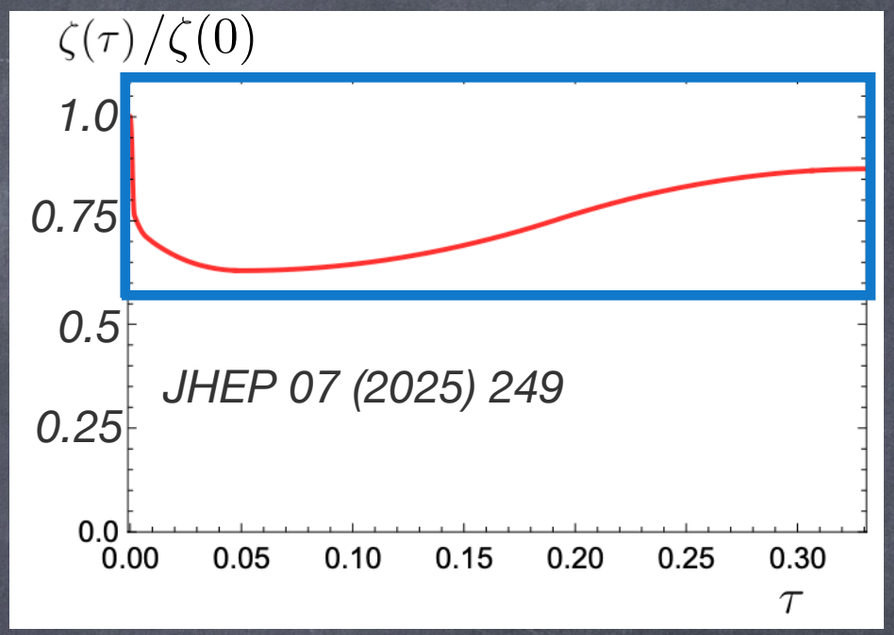

behavior at $\tau < 0.025$ unphysical

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3-jet assumption breaks down

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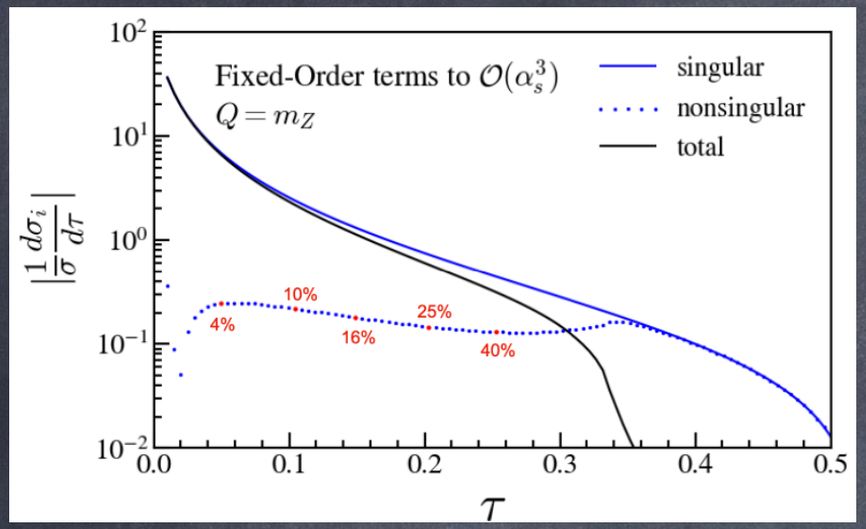

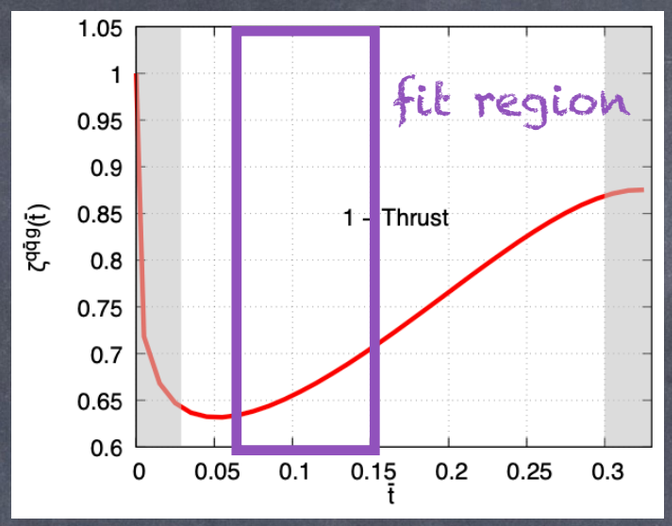

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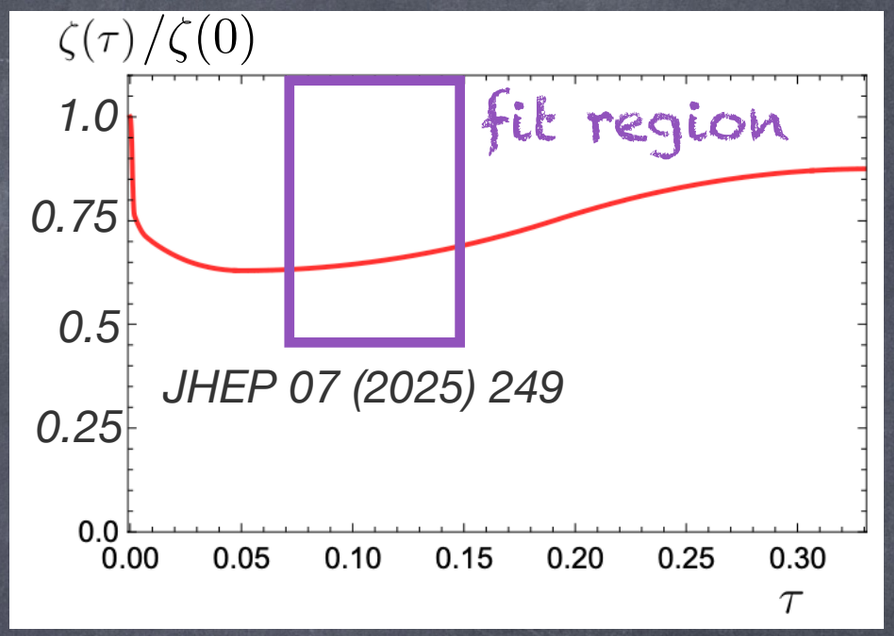

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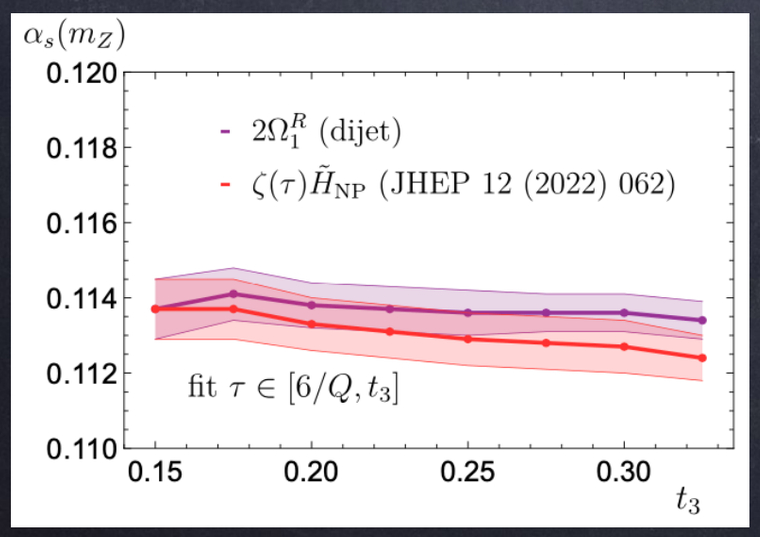
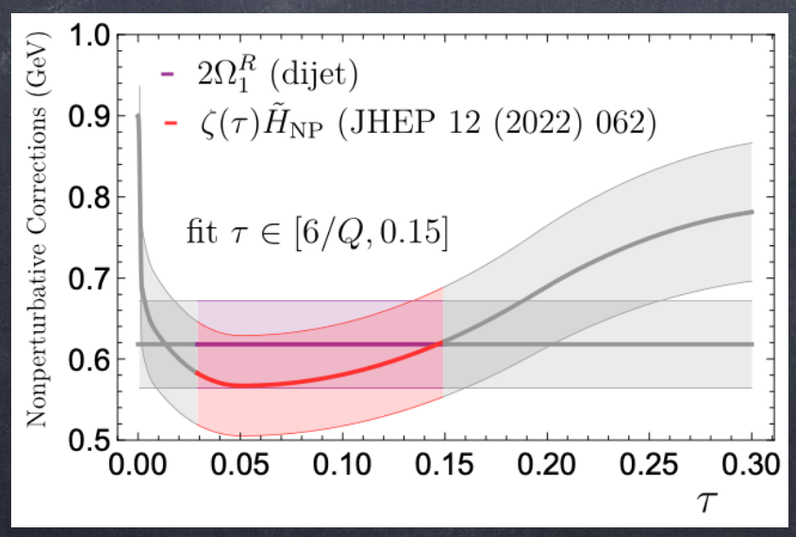
Absolute size irrelevant, only shape matters





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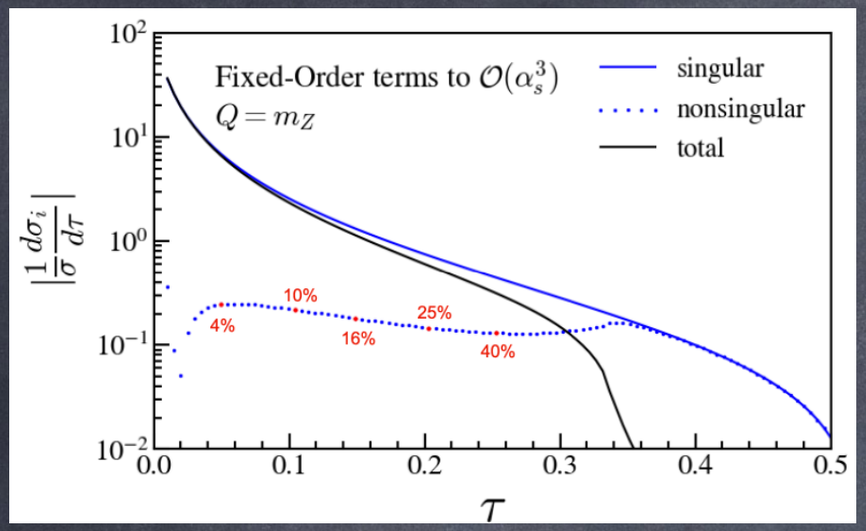

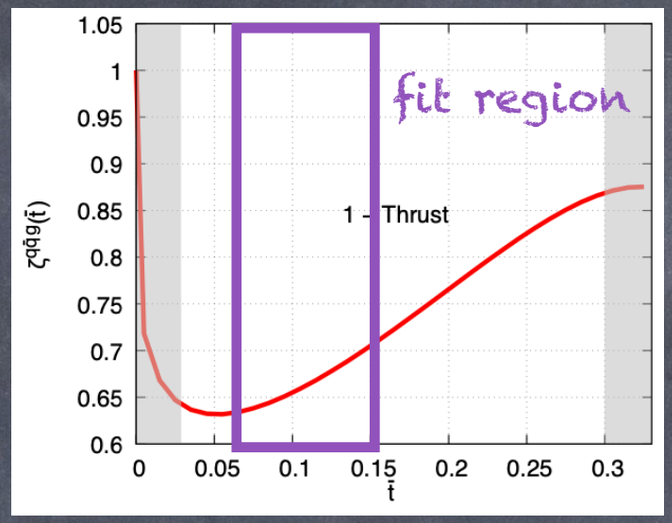

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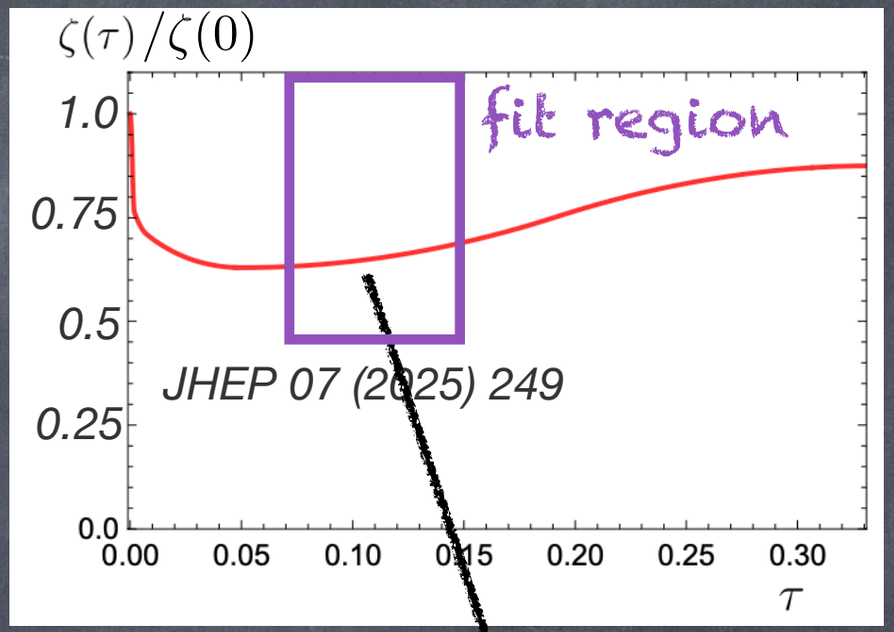

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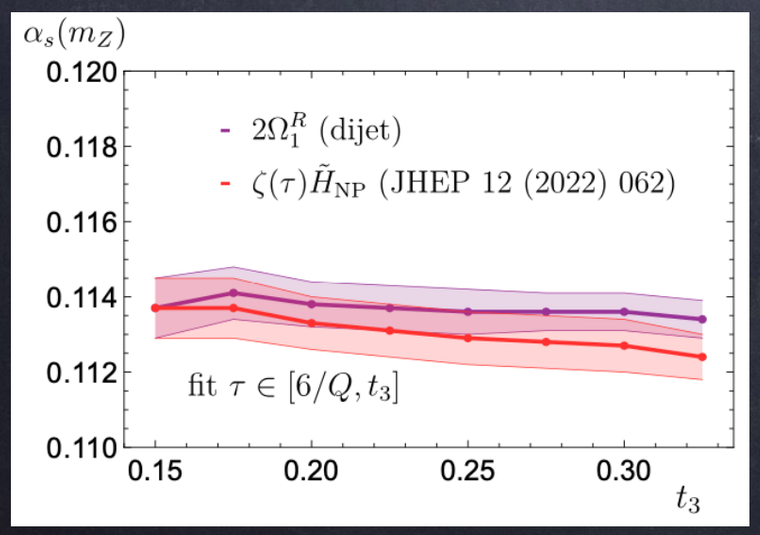
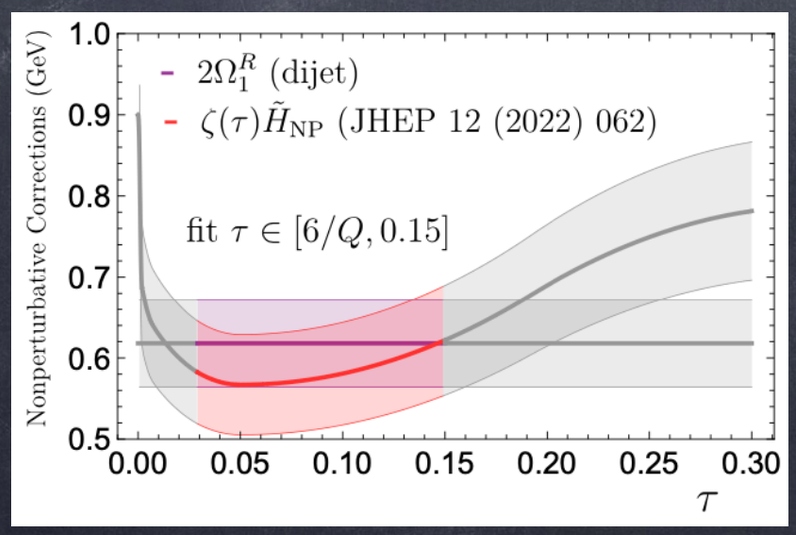
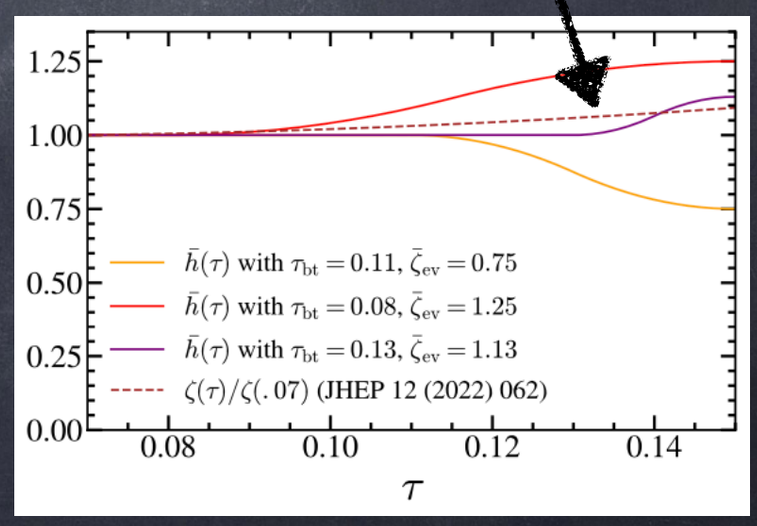
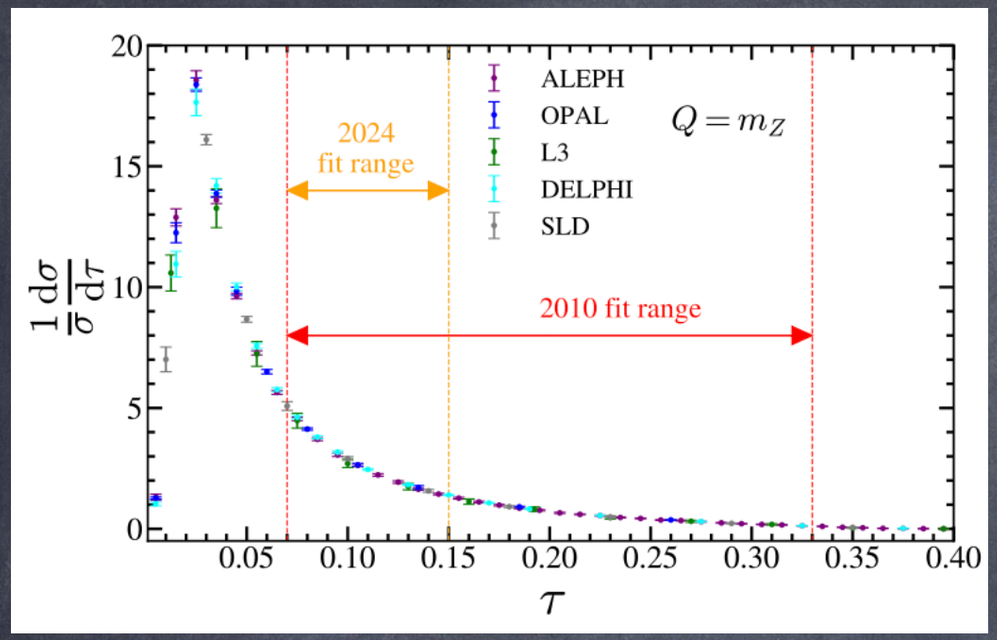
Our conservative modeling of 3-jet power corrections







Uncertainties on α_s



fit ranges (2010 vs 2024)

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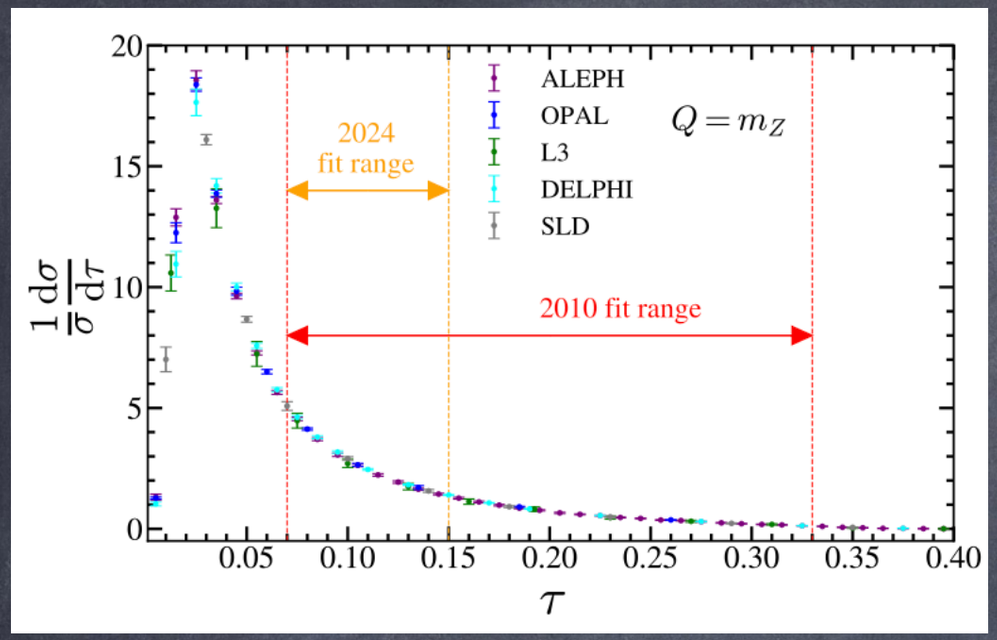

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Ω_1/α_s	0.0007	0.026	✓
Total Experiment + Ω_1/α_s	**0.0008**	**0.028**	✓
Ω_2 hadronization	0.0002	0.013	✓
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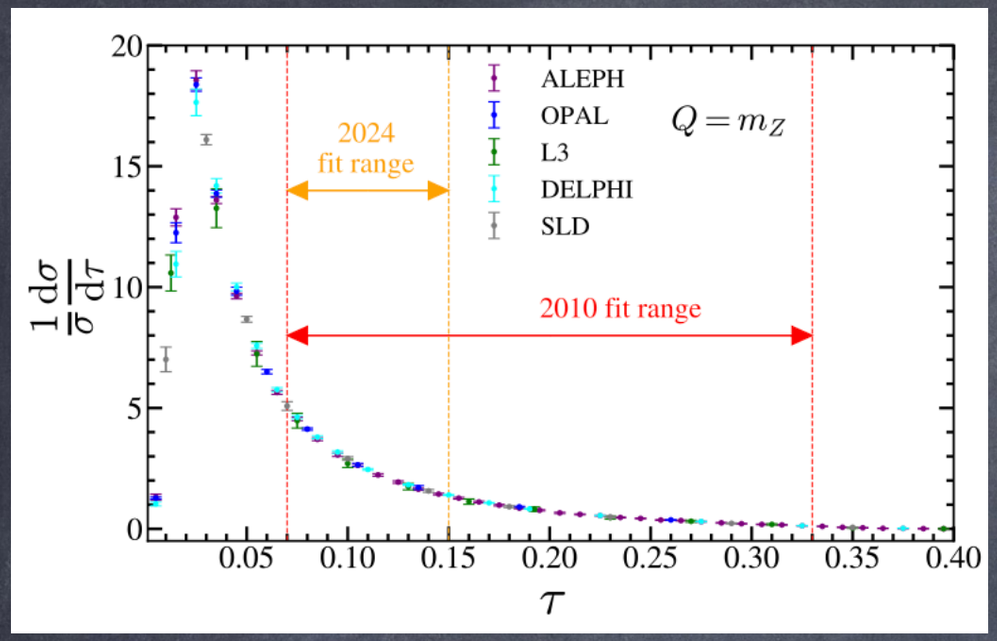

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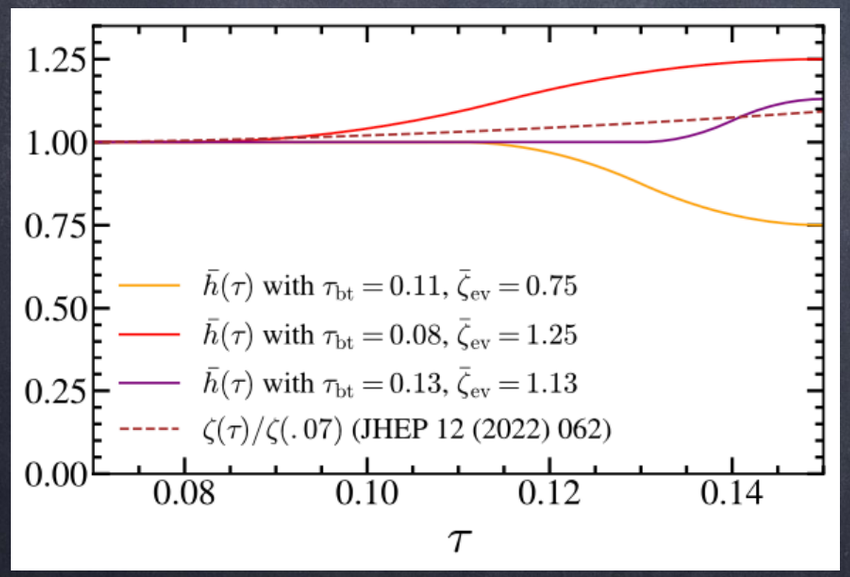

our 3-jet PC model variation covers model of [JHEP 12 (2022) 062]

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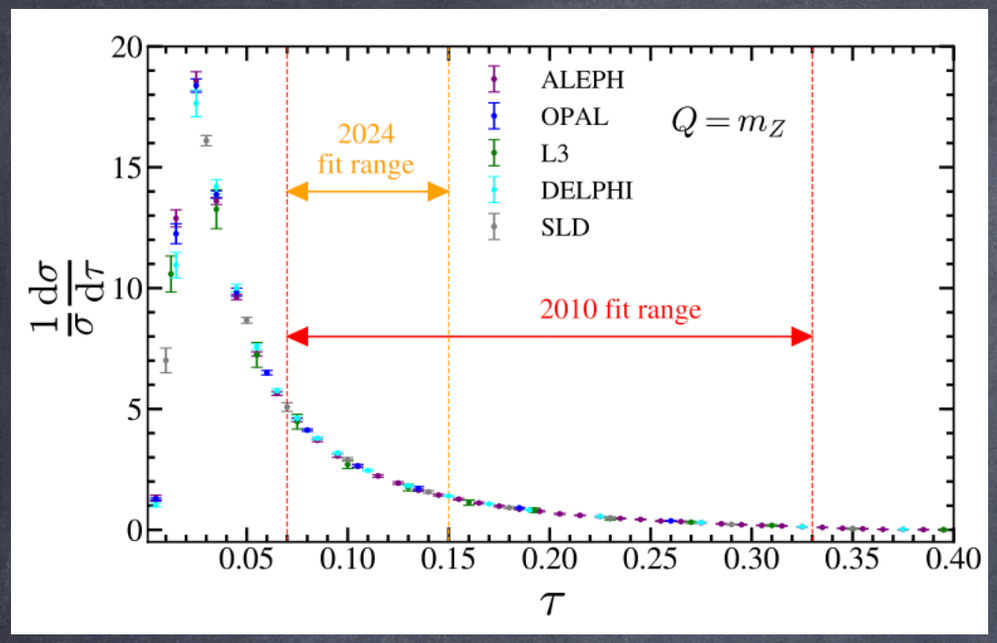

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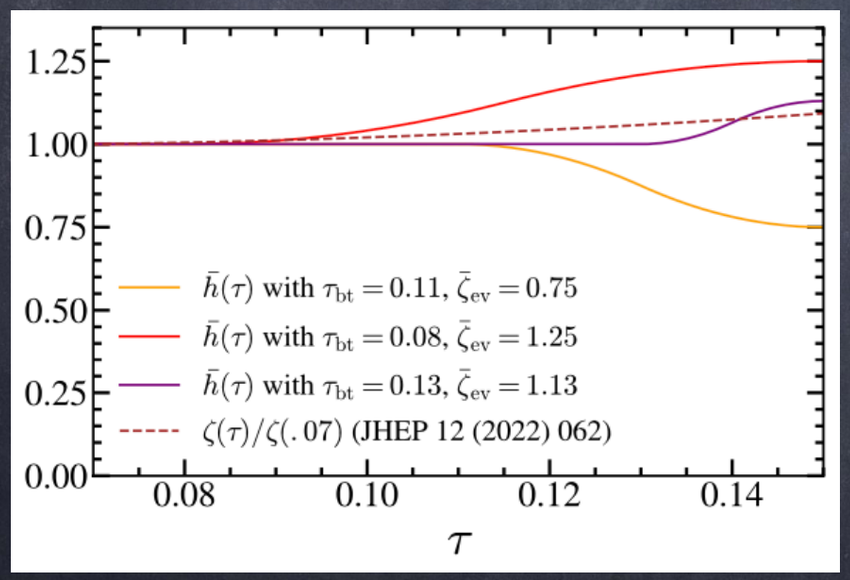

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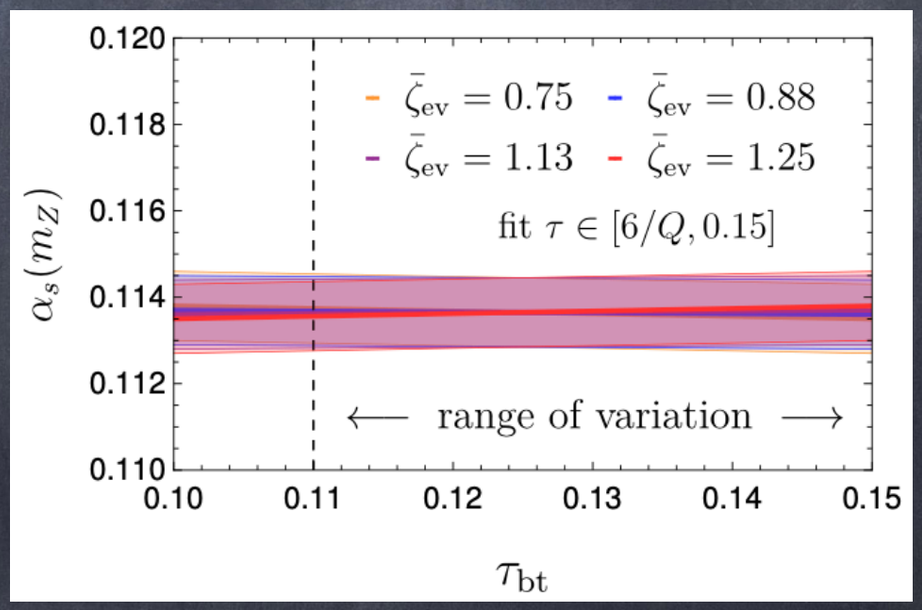

Since our fit are in dijet region, details on 3jet PC are irrelevant