

# $\alpha_s$ (2024) introduction

## $\alpha_s$ (2024) workshop

ECT\* (Trento), 5<sup>th</sup> Feb.–9<sup>th</sup> Feb. 2024

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# $\alpha_s$ workshop “series”

- This is the 5<sup>th</sup> workshop of a series devoted to high-precision studies of the QCD coupling constant:

$\alpha_s$ (2011), Munich: <https://inspirehep.net/literature/930305>

$\alpha_s$ (2015), CERN: <https://indico.cern.ch/e/alphas2015>

$\alpha_s$ (2019), ECT\* Trento: <https://indico.cern.ch/e/alphas2019>

$\alpha_s$ (2022), ECT\* Trento: <https://indico.cern.ch/e/alphas2022>

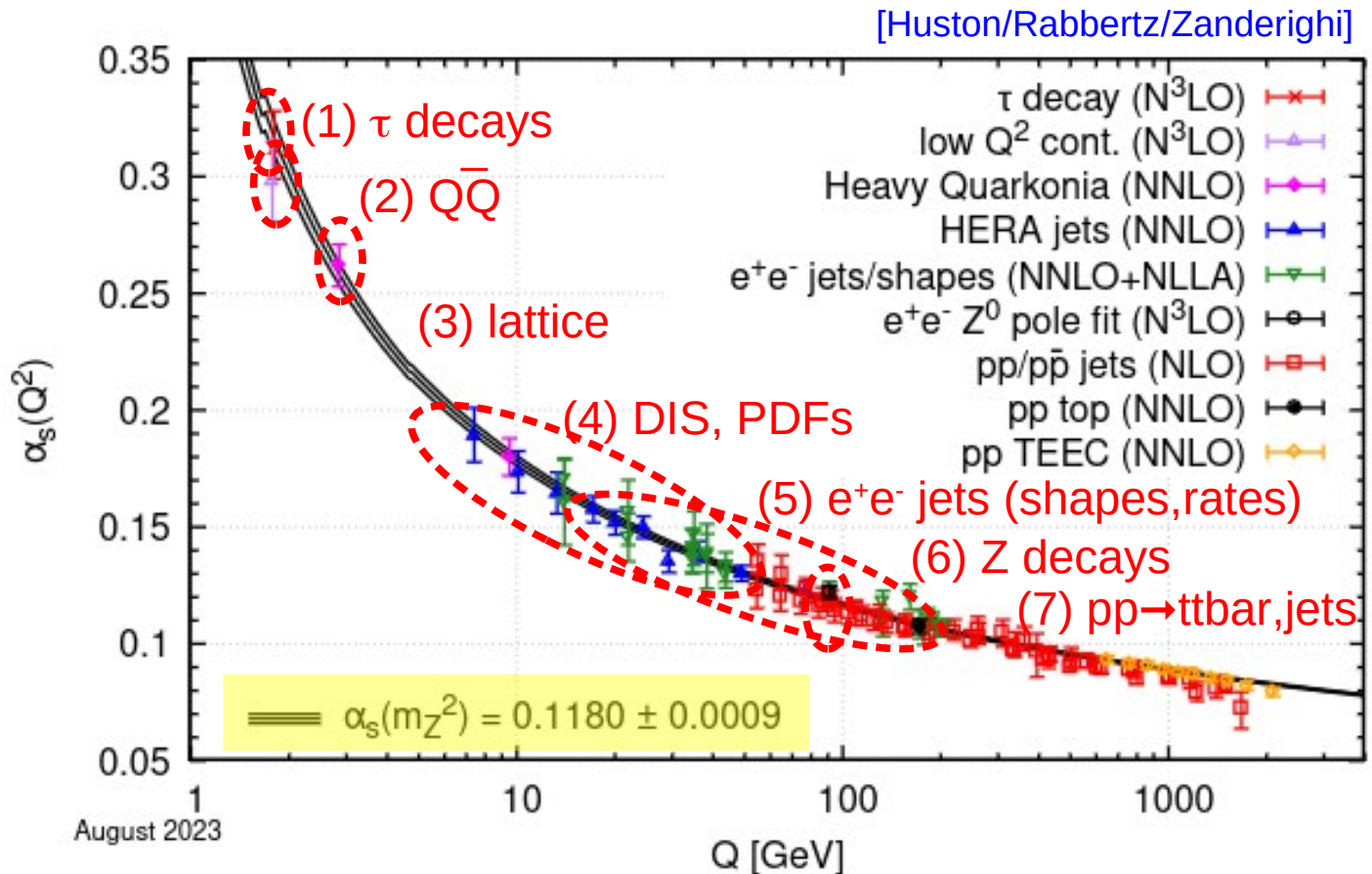
$\alpha_s$ (2024), ECT\* Trento: <http://indico.cern.ch/e/alphas2024>

*[Snowmass WhitePaper/Proceeds: arXiv:2203.08271 [hep-ph], to appear in JPG]*

*“The main scientific goals of this workshop are to **bring together the current best experts in  $\alpha_s$  determination**, to critically **discuss and understand the relevant merits and problems** of each extraction method, and to **consider new  $\alpha_s$  studies** and approaches. One important outcome should be to **assess the perspectives for systematic improvements of theoretical predictions and experimental methods** in order to **resolve discrepancies**, and improve the  $\alpha_s(m_Z)$  world-average extraction.”*

# World $\alpha_s$ determination (PDG 2023)

- Determined today by comparing **7 experimental observables** to pQCD **NNLO, N<sup>3</sup>LO** predictions, plus **global average** at the Z pole scale:



# Structure of the workshop

- Discuss latest developments & prospects in  $\alpha_s(m_z)$  determinations via:
  - (i) **Lattice QCD & Quarkonia**: Mo. afternoon
  - (ii) **DIS & global PDF analyses**: Tues. afternoon
  - (iii) Hadronic final states at the **LHC**: Tues./Wed. afternoon
  - (iv) Hadronic final states in  **$e^+e^-$** : Wed./Thurs. afternoon
  - (v) Hadronic **tau** decays: Thurs. afternoon
- **PDG  $\alpha_s(m_z)$  averaging** discussion: Friday afternoon
- Interactions across participants:
  - All mornings (individual and/or team work)
  - Topical discussions at the end of each day (18:30-19:00)
  - Friday afternoon (if needed)
- **Each talk has an indicative 20'+10' allocated time**, but our goal is to have as lively & direct discussions as possible: **questions during presentations encouraged** (in the philosophy of a truly working-discussion meetg).
- **CERN-Mattermost used to keep minutes** of the presentations and to allow participants to **ask questions or post comments**. Use the "Reply" action (left-pointing arrow symbol) on the presentation's minutes.
- **No Proceedings** this time (unless requested by majority)

# Backup slides