

EF05 Letter of Interest Survey

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EF05 Survey for LOIs

[LINK to survey](#)

Proposed Topics for EF05 LOIs

This is a list of proposed study topics for the EF05 subgroup of the Snowmass 2021 community study.

Email address *

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What is your name and institution? *

Short answer text

Which topics are you interested in?

- Precision measurements of α_S (and perhaps its running) at future colliders
- Development by the high-energy hadron collider and EIC (electron-ion collider) communities of joint bench...
- Study of emerging jet properties at the EIC and how LHC techniques can be utilized in EIC jet studies
- Are jets universal? - Seeking ways of answering this question experimentally

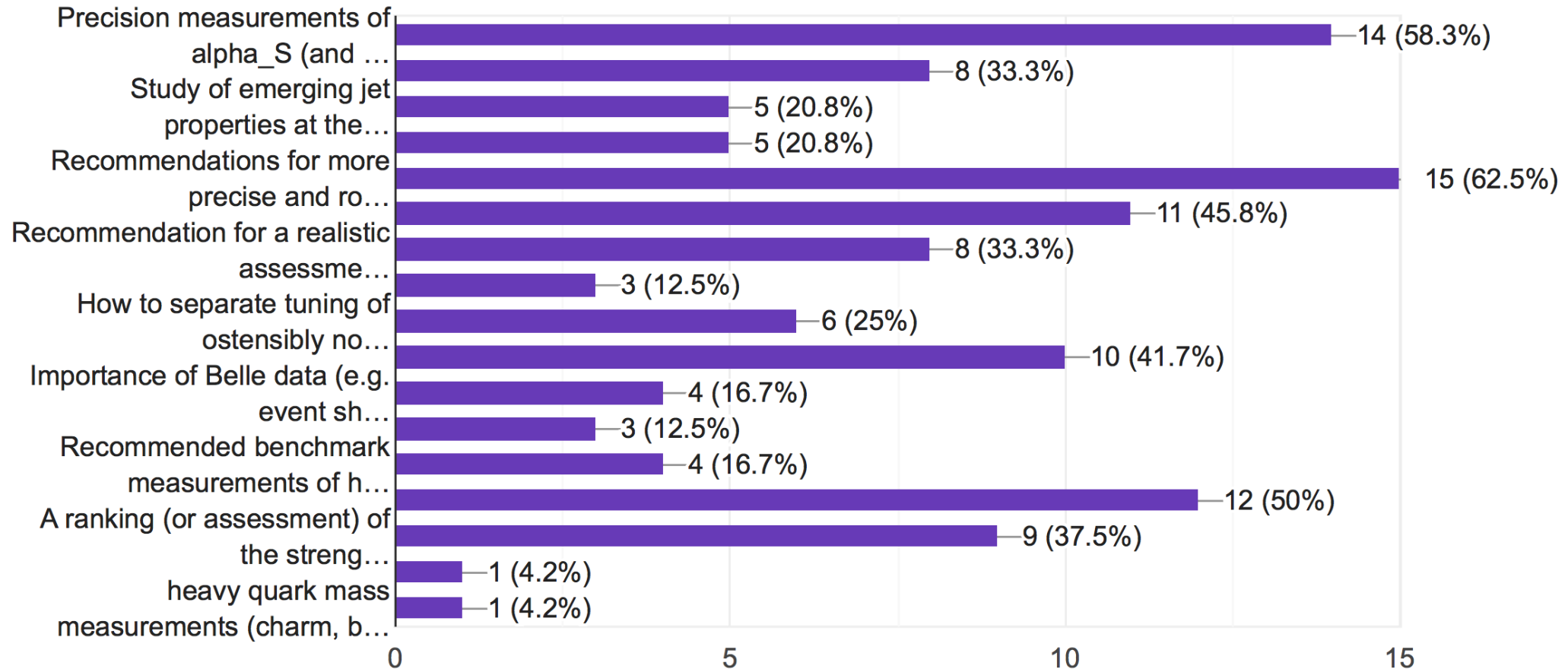
Responders: 14

			Willing to lead?
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Topics proposed by co-convener: 15

Which topics are you interested in?

24 responses



Topics proposed by co-conveners:

Underlined means
willing to lead effort.

Precision measurements of α_S (and perhaps its running) at future colliders

Ball, Bhattacharya, d'Enterria, Forte, Marzani, Nachman, Rojo

Development by the high-energy hadron collider and EIC communities of joint benchmarks for PDFs

Ball, Forte, Lecompte, Rojo

Studies of emerging jet properties at the EIC and how LHC can be utilized in EIC jet studies

Forte, Krauss, Marzani, Nachman

Are jets universal? – Seeking ways of answering this question experimentally

Kar, Nachman, Sjöstrand

Recommendations for more precise and robust assessment of experimental and theoretical QCD uncertainties, including their interplay

Bhattacharya, Forte, Krauss, Lecompte, Nachman, Rojo, Vos

Recommendations for a better definition of renormalization and factorization scale uncertainties and how experimentalists can decorrelate these theoretical uncertainties from measurement uncertainties

Bhattacharya, Ball, Forte, Vos

Topics proposed by co-conveners: (con't)

Underlined means
willing to lead effort.

Recommendation for a realistic assessment of parton shower uncertainties, including correlations

Bhattacharya, Kar, Krauss, Nachman, Vos

Guidance and recommendations for Lattice explorations of PDFs

Rojo

How to separate tuning of ostensibly non-perturbative or technical parameters like h_{damp} from perturbative physics (which should be parameters free)

Bhattacharya, Kar, Krauss, Vos

Using minimum-bias data from the LHC to learn about non-perturbative physics

Bhattacharya, Kar, Krauss, Murray, Nachman, Sjöstrand, Vos

Importance of Belle data (e.g. event shapes) to constrain non-perturbative physics

Krauss, Nachman, Sjöstrand

Assessment of what can be learned from neutrino data for non-perturbative physics such as fragmentation

Krauss

Topics proposed by co-conveners: (con't)

Underlined means
willing to lead effort.

Recommended benchmark measurements of hadron spectra, etc., to constrain non-perturbative QCD physics

Krauss, Sjöstrand, Vos

Recommendations for better measurements of multi-parton interactions and the underlying event at hadron colliders

Bhattacharya, Kar, Krauss, Nachman, Sjöstrand, Vos

A ranking or assessment of the strengths and weakness of existing MC event generators

Bhattacharya, Braß, Lecompte, Krauss, Murray

Topics proposed by responders as part of the survey:

Determination of heavy quark masses

Forte, Vos

Topics already submitted as LOIs:

Precise predictions for Higgs pair hadroproduction

Ajjath, Chen, Das, Li, Mukherjee, Ravindran, Shao, Wang

Forward jets and dene systems

van Hameren, Kotko, Kutak

Jets and jet substructure at future colliders

The BOOST community [Ben Nachman et al.]

Probing high scale physics via standard model parameters

Dunsky, Hall, Harigaya

Next Steps:

- Self-identified leaders for each of 16 topics should contact the other members
- Refine the definition of the topic. Splitting and merging is OK if everyone agrees.
- New topics are allowed – even encouraged.
- By Thursday send us a draft of the LOI.
- We will send feedback by Saturday.
- Leaders for each topic should submit the LOI at the Snowmass portal by Monday.

“An extended abstract”

Two pages max, not counting figures, tables, or references.

Say what you intend to do.

<https://snowmass21.org/loi>

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BACKUP SLIDES

EF05 Focus Questions – *starting to formulate these*

1) What is the ultimate precision for α_S and how do we achieve it?

From the LHC, future pp, future e+e-, DIS (ep and eA), particle decays (tau, hadrons), and lattice

2) Evaluation and interplay of uncertainties from theory (including theoretical scales used in PDF extraction, non-perturbative effects) and from experiment. [Task force]

3) Task force on the quantification of non-perturbative uncertainties, in cross-cutting effort between lattice QCD and MC community

4) What theoretical developments are needed to support precision measurements of Higgs and top quark production and properties (including electroweak corrections, non-perturbative threshold effects)?

5) Inclusion of higher-order QCD calculations in Monte Carlo event generators.

6) Parton shower development (including EW emission, color flow, multi-parton interactions, scale choices) and jet substructure observables.

[Together with EF06] What is the future of PDF determinations?

From the LHC, DIS

Theoretical developments (NNLO, photon, pion, other)