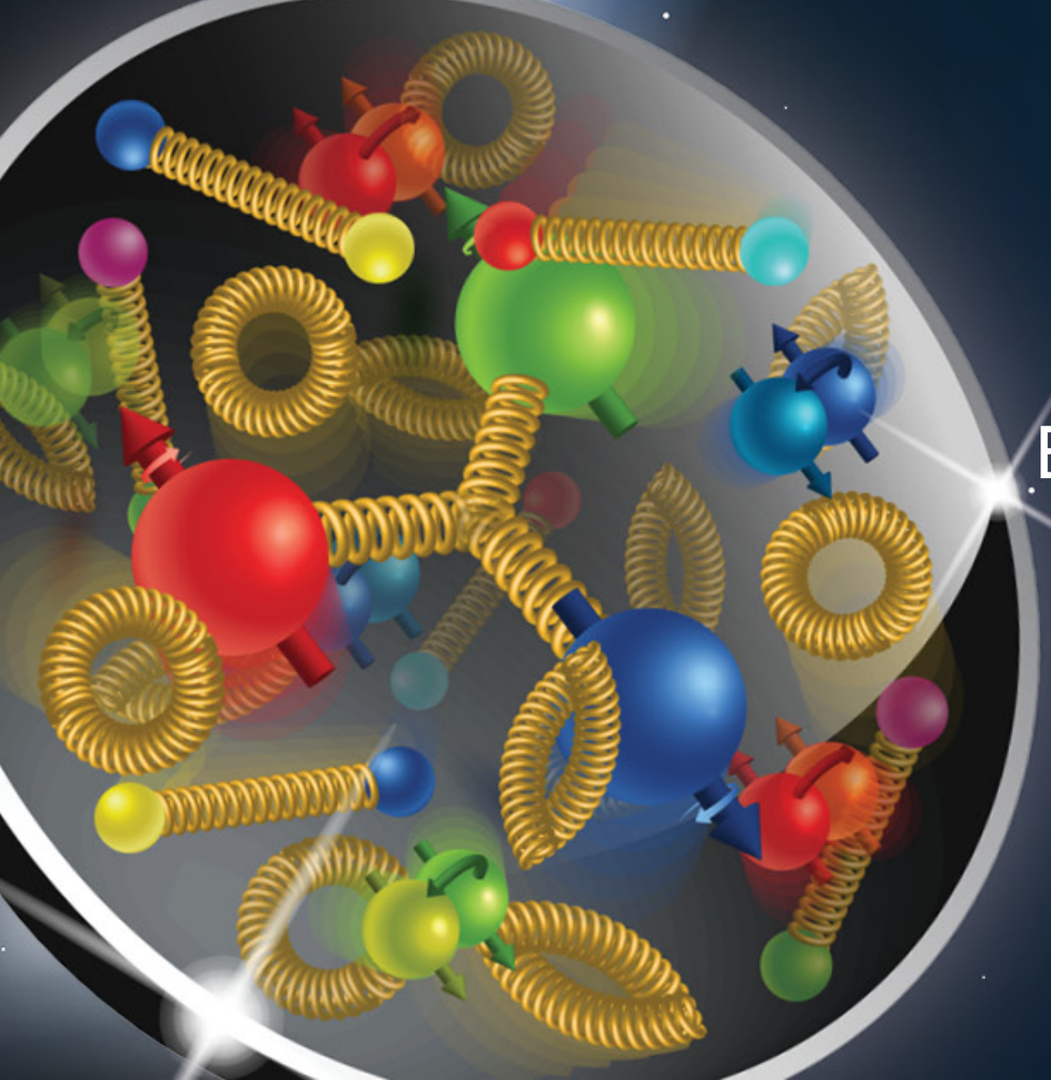
Snowmass 2020 Letter of Interest: Hadronic Tomography at the EIC and the energy Frontier



Editors: Salvatore Fazio, Tim Hobbs, Alexei Prokudin, Alessandro Vicini

The Snowmass Process is organized by the Division of Particles and Fields (DPF) of the American Physical Society.

For details, please see: https://snowmass21.org/start.

We were solicited by conveners of

- EF06: Hadronic structure and forward QCD [conveners: Huey-Wen Lin (MSU), Pavel Nadolsky (SMU), Christophe Royon (Kansas)]
- EF07: Heavy Ions [conveners: Yen-Jie Lee (MIT), Swagato Mukherjee (BNL)]

“We are seeking your help and contributions to identify how EIC can and should contribute to the future of HEP.

The Snowmass process is an opportunity for the entire high energy physics (HEP) community to come together to identify and document a vision for the future of particle physics in the U.S. and its international partners. The product of the Snowmass process is a document that will serve as an important input to Particle Physics Project Prioritization Panel (P5) provides the long-term strategy and identifies the priorities for U.S. investments in particle physics that will enable discovery and maintain the U.S. position as a global leader. ”

120 co-authors/signers

Snowmass21 Letter of Interest

Hadronic Tomography at the EIC and the Energy Frontier

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The document be found here:
https://www.snowmass21.org/docs/files/summaries/EF/SNOWMASS21-EF6_EF7-TF5_TF7-CompF2_CompF3_Hobbs-205.pdf

Document/effort enjoys significant community support

- EIC will focus on determination of partonic structure (TMDs, GPDs, PDFs)
- Tomography encompasses a wide range of topics related to EIC and HEP community interests
- Precision goals of HL-LHC depend partly on hadron structure information
- Tomography will be a collaborative effort EIC/LHC

Physics topics examples:

- TMD measurements and precision EW physics (TMDs and M_W extractions)
- Gluonic structure and Higgs (gluon PDFs)
- QED effects (photon PDF, improved EW corrections)
- Nuclear structure (nuclear PDFs etc)
- TMDs and SM predictions (tensor charge)

Methods examples:

- Global analyses and phenomenology
- Continuum QCD approaches
- Lattice QCD studies
- AI and Machine Learning methods and MCEGs