Anomaly Detection at Future Colliders

Letter of Interest for Snowmass 2021

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While it is important to have dedicated model specific searches, it is also critical that we consider a strong research program around model agnostic approaches. The LHC Olympics 2020 has organized members of both the experiment and theory communities to test new methods for anomaly detection using simulated collider data. The results were discussed at two workshops:

Winter Olympics (January 2020): https://indico.cern.ch/event/809820/timetable/
Summer Olympics (July 2020): https://indico.desy.de/indico/event/25341/

We are currently writing a community paper to document the LHC Olympics and part of this report will be about anomaly detection at future colliders. In particular, we will focus on considerations that will inform the selection of a future collider, the design of a detector (including trigger, offline software, etc.), and the allocation of resources for research and training. This work is cross-cutting and most strongly aligns with the ***BSM Physics*** [EF08, EF09, EF10] topical groups of the ***Energy Frontier*** as well as the **Machine Learning** [CompF3] topical group of the **Computational Frontier**. This community report will be linked as a white paper for Snowmass.

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