Long-lived particles WG: the experimental perspective
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Kick off LLP WG meeting
May of 2020

Trigger preparation for Run 3

- Feedback from **Community workshops** - ideas and recommendations (what happened before)

- Provide recommendations to experiments based on upgrade plans

- **Liaise with theorists** to make sure nothing is overlooked

- **Target** - produce a dedicated trigger white-paper with recommendations

- **Example** - LHCb will rely on software-only triggers:

  - Dedicated turbo triggers (low bandwidth) to be implemented

  - Ideal for producing fast results on targeted ideas

Benchmark models and recasting

- **Long-standing questions we all worry about:**

  - How results should be presented such they are maximally useful for theorists?

  - Which are the best benchmark models so results can be properly combined?

- **Provide recommendations to experiments on how to present results:**

  - Agree on a set of simplified models and recommendations:

  - Which models are more important for Early Measurements in Run 3?

  - Discuss and agree on limit-setting benchmarks

- **Prepare combined and summary plots *à la* PBC:**

  - Find a common way to share LHC results and let others work on them

  - Potential sub-WG to take care of these? available manpower?

  - Take care of recasting as well in this work package?

Tools and simulation

- **Ensure we are all on the same page in terms of simulation:**

  - Schedule and coordinate joint meetings among the experiments

  - Integrate models for LLPs in experiments' frameworks

  - Solve long-standing problems in simulation, i.e. HNL polarisation

  - Provide open-source tools for theorists (i.e. Delphes, Rivet, Lamarr)

- **Development of novel/missing tools:**

  - Ensure collaboration across experiments and with theorists

- **Use of Machine Learning across experiments:**

  - Online: jet tagging in LHCb

  - Offline: hadronic tau reconstruction in CMS/ATLAS (helpful e.g. LHCb) (ATL-PHYS-PUB-2019-033 and CMS DP-2019/033)

- **Potential sub-WG(s) to take care of these? available manpower?**

Others

- **Coupling to the third generation**

- **Complementarity between experiments:**

  - Between dedicated and major experiments, e.g. CMS/MoEDAL [2004.11305]

- **How to compare with non-LHC experiments:**

  - Similar efforts to what our DM WG colleagues have done

- **Relation and discussion with the Snowmass process:**

  - Common message from the WG

  - Assist single experiments in their input

- **Interface with the PBC catalogue on sensitivity results**

- **Take particular care in materialise the work done in documents:**

  - Documents can be internal at first and subsets subsequently published

  - HL-LHC/Run-4 recommendations should be the focus of a separate document