Discussion session

LLPs at Belle II: connecting theory and experiment

Martino Borsato
Brian Shuve

Signature-driven approach

- Current approach: Tailoring searches to very specific models
  - can give good sensitivity
  - limits coverage and reinterpretation

- Signature-driven approach as a paradigm shift
  - map the LLP parameter space
  - ensure possibility of reinterpretation
  - avoid redundant searches

- Challenges compared to high-energy collider?
  - detector parametric simulation (à la Delphes)
  - reinterpretation of searches
  - less to distinguish signal vs. background? signals have lower mass, track multiplicity, etc.

Reinterpreting Searches

◉ Being able to reinterpret searches is crucial for a signature-driven search program, and makes dedicated searches more broadly applicable!

- "model-independent" limits on cross sections times BF

- object reconstruction efficiencies allow broader range of reinterpretation

- non-standard reconstruction of LLPs makes this more difficult than searches with prompt particles

◉ Shared th-exp software tools:

- standard simulation pipeline

- detector parametric simulation (à la Delphes)

- good ways of simulating backgrounds?

LLP program at Belle II

◉ What are the key LLP searches at Belle II?

- What is missing? What is redundant?
- Searches for LLPs from B decays (interplay with LHCb?)

◉ Can Belle II make use of subdetectors for searches?

- ATLAS/CMS used calorimeters and muon chambers
- Belle II is smaller but so is the boost

◉ How should analyses be designed and presented to facilitate reinterpretation?

- Lessons from the LHC?