Working Group Schedule

• Monday (27/05):
  - Kick-off talk: 14:00-14:15
  - Preparation: 16:00-17:00 (TH Conference Room)

• Tuesday (28/05):
  - Session 1: 9:00-10:30 (Bohr)
  - Session 2: 11:00-12:30 (Bohr)

• Wednesday (29/05):
  - Summary: 12:15-12:25
Working Group Topics
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• Presentation of results
  • LLP white paper recommendations
  • Recent examples
  • Future goals/recommendations
  • …
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- Presentation of results
  - LLP white paper recommendations
  - Recent examples
  - Future goals/recommendations
  - ...

- Reinterpretation/Recasting
  - Simplified Models
  - MC Simulation (outside collaborations)
  - Challenges
  - Past experience: successes/failures
  - ...

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- Presentation of results
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- Reinterpretation/Recasting
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Presentation of Results

• LLP searches are more challenging than “standard” searches (prompt, cut and count)

• No public tool for detector simulation/object reconstruction

• Presentation of results should include additional information
Presentation of Results

- LLP searches are more challenging than “standard” searches (prompt, cut and count)
- No public tool for detector simulation/object reconstruction
- Presentation of results should include additional information
1. **Simplified Models**: directly apply upper limits (or topology efficiencies)

2. **Simulation**: use reconstruction/selection efficiencies

**Presentation and Recasting**
Reinterpretation: SMS

- No MC uncertainties (SMS provided by experimental results)
- Requires proper parametrization of parameter space
- More SMS the better!
- Efficiencies are preferred over upper limits
Reinterpretation: SMS

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- Requires proper parametrization of parameter space
- More SMS the better!
- Efficiencies are preferred over upper limits

- White paper SMS list:

Good for testing experimental coverage, probably not sufficient for reinterpretation (no cascade decays, few asymmetric topologies...)
Reinterpretation: SMS

- **Proof of principle (SMoDeIS):**

  ![2HDM Diagram](image)


- Only HSCP searches (so far)
- ~10 simplified models in the database
- Big improvement when compared to upper limits for direct production only

![Leptophilic DM Diagram](image)

Reinterpretation: SMS

- **Proof of principle (SModelS):**

  2HDM
  

- Only HSCP searches (so far)
- ~10 simplified models in the database
- Big improvement when compared to upper limits for direct production only

Leptophilic DM


Complementary to MC simulation!
Reinterpretation: Simulation

- Detector simulation and object reconstruction efficiencies are challenging
- Several examples (LLP White Paper):
  - HSCPs, displaced jets, displaced Leptons, displaced photons...
- *Useful experimental efficiencies are essential!*
Reinterpretation: Simulation

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- Several examples (LLP White Paper):
  - HSCPs, displaced jets, displaced Leptons, displaced photons...

- *Useful experimental efficiencies are essential!*

- **Example:** ATLAS-CONF-2017-026 vs ATLAS-SUSY-2016-08

\[ m_{\tilde{g}} = 2000 \text{ GeV} \]

\[
\begin{array}{c}
\text{\textit{ATLAS}} \\
\text{Recast (}\varepsilon_{\text{track}} = 100\%\text{)} \\
\text{Recast (}\varepsilon_{\text{track}} = 25\%\text{)} \\
\text{Recast (}\varepsilon_{\text{track}} = 15\%\text{)}
\end{array}
\]

\(~50\% - 1000\%\) uncertainties
Reinterpretation: Simulation

- Detector simulation and object reconstruction efficiencies are challenging
- Several examples (LLP White Paper):
  - HSCPs, displaced jets, displaced Leptons, displaced photons...
- *Useful experimental efficiencies are essential!*

- **Example:** ATLAS-CONF-2017-026 vs ATLAS-SUSY-2016-08

\[ m_\tilde{g} = 2000 \text{ GeV} \]

\[ \bar{\sigma}_{UL} \text{ [fb]} \]

\[ \text{Ratio} \]

\[ \tau \text{ [ns]} \]

\[ \leq 5\% - 50\% \text{ uncertainties} \]
Reinterpretation: Simulation

- No public tool for detector simulation/object reconstruction
- Recasting is a big effort ➔ avoid duplicated work

https://github.com/andlessa/LLPrecasting
Reinterpretation: Simulation

- No public tool for detector simulation/object reconstruction
- Recasting is a big effort ➔ avoid duplicated work
- Public repository?  https://github.com/andlessa/LLPrecasting
Working Group Topics

- Presentation of results
  - LLP recommendations
  - Review recent results: required info is available?
  - New ideas? (efficiencies as NNs, ...)
  - ...

- Recasting/Reinterpretation/Simulation
  - Review recent results: required info is available?
  - Public repository
  - ...

Preparation Session: 16:00-17:00 (TH Conference Room)
Public Repository

https://github.com/andlessa/LLPrecasting