From LHC RiF to REI WG

Reinterpretation Forum Workshop, Feb 2025

Martin Habedank (ATLAS), Sabine Kraml (theory), Sezen Sekmen (CMS)
28th February 2025

Questions to the audience

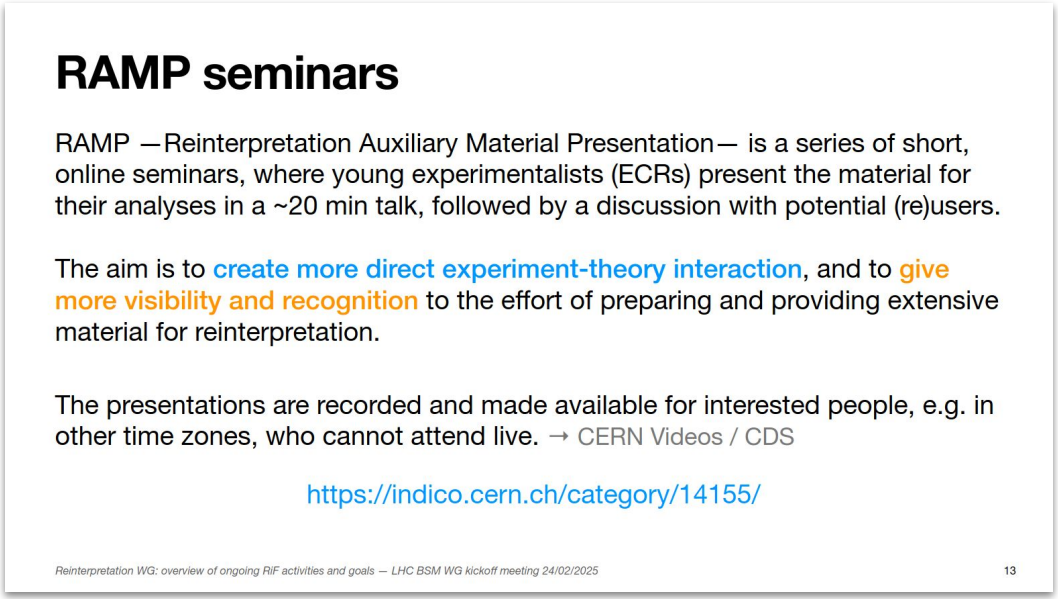
We’d like to hear from you!

1. What did you like about the workshop?
2. What would you want improved about the workshop?
3. What is a topic the new REI WG should focus on?

(*Pick one(!)*)

RAMP seminars

As pointed out by Sabine on Mon (LHC BSM WG kick-off):



RAMP seminars

RAMP —Reinterpretation Auxiliary Material Presentation— is a series of short, online seminars, where young experimentalists (ECRs) present the material for their analyses in a ~20 min talk, followed by a discussion with potential (re)users.

The aim is to create more direct experiment-theory interaction, and to give more visibility and recognition to the effort of preparing and providing extensive material for reinterpretation.

The presentations are recorded and made available for interested people, e.g. in other time zones, who cannot attend live. → CERN Videos / CDS

https://indico.cern.ch/category/14155/

Reinterpretation WG: overview of ongoing RiF activities and goals — LHC BSM WG kickoff meeting 24/02/2025 13

Currently organised by
Louie Corpe and SK

We need **volunteers** from the experiments to be **RAMP co-organisers.**
(help identify suitable speakers, run the meetings)

RAMP seminars are great and important! But need **more publicity within the collaborations** – across all physics groups – for speaker nominations.
NB self-nominations are also welcome.

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LHC Beyond the Standard Model WG

Mandate: The LHC beyond the Standard Model (BSM) physics working group (LHC BSM WG) brings together theorists and experimentalists to define guidelines and recommendations for the benchmark models, interpretation, and characterisation of BSM searches at the LHC. As examples, the group develops and promotes well-defined signal models, specifying the assumptions behind them and describing the conditions under which they should be used. This would include both simplified models for specific signatures (experiment driven) and full models (theory driven). It works to improve the set of tools available to the experiments, such as higher-precision calculations of the backgrounds, where applicable working together with the other working groups. It also includes support to theorists for the reinterpretation of published LHC experimental results and discussions amongst experiments on common reconstruction developments.

https://lpcc.web.cern.ch/content/lhc-bsm-wg

BSM WG
- Dark Matter
- Long-lived particles
- Prompt BSM signatures
- Reinterpretation

EFT WG
Electroweak WG
Forward Physics WG
Heavy Flavour WG
Heavy Ions WG
Machine Learning WG

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LHC REI WG:
BSM re-interpretation of LHC results

This subgroup of the BSM WG builds on the experience of the long-established LHC re-interpretation forum (RIF), which will continue working under the umbrella of the BSM WG in continuity with its original scientific goals.

The REI WG provides a platform for continued discussion of topics related to the BSM (re)interpretation of LHC data, including the development of the necessary public Recasting Tools and related infrastructure.

Conveners:

- ATLAS: Martin Habedank
- CMS: Sezen Sekmen
- LHCb: Carlos Vazquez Sierra
- Theory: Sabine Kraml
- LPCC: Michelangelo Mangano

Contact us: lhc-reiwg-admin@cern.ch

https://lpcc.web.cern.ch/content/lhc-rei-wg

Critical keyword: MANDATE. So, let's make the most of it!

BSM WG
- Dark Matter
- Long-lived particles
- Prompt BSM signatures
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REI WG — plans and action items

- Raise more awareness on why reinterpretability is crucial
- Highlight the specific information (aka auxiliary material) required
- Build a more coordinated effort within and across the collaborations in providing this information
- Highlight reinterpretations/usage of reinterpretation materials in practise
- Propagate new ideas / developments that the community can benefit from
- Pinpoint possible and needed task forces for the REI WG

REI WG — coordinated effort with collaborations

- Develop automated tools and infrastructure to provide public information
- Full presentations of the analysis physics algorithm (ADL, SimpleAnalysis, Rivet, direct implementations in public recast tools).
- Statistical models (→HS3), nuisance parameter naming conventions.
- Infrastructure for publishing generator information (models, parameter cards, process cards, versions, ...)
- Coordinated effort in publishing object efficiencies (leptons, boosted objects, LLPs, ...)
- Workflow for publishing (reusable!) ML models
- Make sure simplified model results are useful and reuseable
- Automated way to transfer information to HEPData?
- Facilitate post-publication release of missing material.

Suggestions for REI actions (topical groups)

- **“Reinterpretability”**
  - Analysers who did a good job with their analysis to share their experience within the collaborations (give motivating positive examples)
  - Hands-on reinterpretability workshops at CERN and online (hybrid mode)
- **“Open MC Samples”** (talk 1, talk 2)
  - Formats for ATLAS/ CMS Open Data/ Open MC …
  - In a wider view, generally MC data release, not just the format
- **“Fast Simulation”**
  - Delphes tuning on Open Data
  - Public smearing functions
  - Public reco efficiencies
  - Unfolded results

Suggestions for REI actions (topical groups) II

- **“Inter-collaboration pMSSM effort”**
  - Sharing/exchanging scans
  - Harmonised presentation of results (for two-ways comparability, in addition to ATLAS/CMS own approach)
- **“Open Statistical Models”**
  - Identify models for publication with CMS Combine
  - Interface with HS^3, ensure that really becomes a standard?
  - HEPData converter
  - Workspace explorer connected to HEPData
- **“ML recommendations”** (talk 1, talk 2)
  - How to preserve ML using low-level variables?
  - Where to publish ML? (HuggingFace, Zenodo, …)
  - Surrogate models?
- **Other/more suggestions?**