(Re)interpreting the results of new physics searches at the LHC: notes from the general discussion on June 17, 2016

BSM Rivet analyses

Consensus seemed to be that the collaborations submitting their own RIVET BSM analyses was the preferred option. If this is taken forward, Moriond 2017 is the earliest that we can expect such analyses to appear (ATLAS). The complication compared to `ordinary' RIVET analyses is the need to account for detector smearing and reconstruction efficiencies. It is still not completely clear whether and in what form the experiments will be able to provide these. One question is whether these functions should be provided on an analysis by analysis basis or as global functions that work across many analyses. According to RIVET authors, ATLAS prefers that these are supplied with each analysis (but in reality the same functions may be reused). Efficiency and smearing functions would take the form of usual RIVET 'projections' inside each analysis.

Cutflows

Cutflows have become the standard way for reinterpretation tools to validate analyses. Theorists would appreciate cutflows included as auxiliary material with all analyses. In addition, cutflows for all signal regions given in an analysis would be very useful. Majority of exotic analyses do not currently have cutflows included.

Correlation matrices

Pushed from the theory side but (I think it's fair to say) little enthusiasm on the experimental side. Probably best way forward is to try and engage small groups of experimentalists and see if an example can be produced to show the idea works - see CMS monojet (Pat)

Aggregate CMS signal regions

CMS analyses often contained very finely binned signal regions where the full likelihood (or correlation matrix) is required to reinterpret search (otherwise limits are significantly weakened). In addition, CMS now provides aggregate (and 'ultra-tail') signal regions where a combination is done internally over the fine-binning. These allow a simple reinterpretation to much more easily reproduce the official limits (a slightly weaker bound is still found) In the absence of the likelihood or correlation matrix being made available this is very valuable for re-interpreting. CMS example: http://cms-results.web.cern.ch/cms-results/public-results/publications/SUS-15-003/index.html

Multi-Variate Analyses

Pointed out to collaborations that if MVA's are used in an analysis, this currently makes reinterpretation impossible. Collaborations were asked if MVA function could be published as auxiliary material. An idea discussed was the possibility for a few experimentalists and theorists to collaborate to reinterpret an existing analysis that contains an MVA as a proof of principle.

LHCb

Likelihoods that LHCb provides and information the collaboration is willing to provide is fantastic. Many people expressed the opinion that this should be an example to all other LHC collaborations.

LHADA

Useful to investigate further but a working example is required as soon as possible.

HEPData

Consensus is that HEPData is the best place for all experimental data to be stored. ATLAS already uploads the majority of SUSY and exotic searches CMS currently has not uploaded any SUSY or exotics searches but this policy should soon change. Missing from HEPData are detector performance plots, theorists would appreciate such plots being uploaded. A question raised was whether detector performance plots can be uploaded even without corresponding publication. This does not need to include actual data but plots showing the expected detector performance from Monte-Carlo would also be very useful. Another question asked about the possibility of linking theory code implementations of analyses (e.g. MadAnalysis, CheckMATE, ATOM...) to HEPData entry. Improved functionality for searching for and for extracting data from HEPData was asked for. In particular, it would be very convenient if the data extraction was more flexible, e.g. if one could get all the data (or selected data) from one analysis that has the same axes and the same binning in one big multi-dim file. That would be much easier than downloading 15 table which all have the same axes and binning.

Theory Reinterpretation Codes

Good practice would be to make all validation material publicly available (SLHA files, Monte-Carlo codes, event files, etc)

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This topic: LHCPhysics > KickoffSummaryNotes
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