Contribution ID: **27** Type: **not specified**

Combining orthogonal LHC new physics searches.

Wednesday, December 14, 2022 11:25 AM (15 minutes)

The combination of LHC results is of great relevance if we want to obtain a deeper more comprehensive understanding of the data collected by the experiments. In practice, it would allow us to derive stronger limits on Beyond Standard Model (BSM) theories, and to perform searches for dispersed signals, as well searching for deviations from the Standard Model in the observed data. However, the combination of LHC analyses requires an exact knowledge of their correlation, which is certainly not straightforward to determine. Nonetheless, we can determine if signal regions (SRs) from different analyses are approximately independent from each other by estimating the corresponding degrees of overlapping events; hence, can be trivially combined. In this talk, we present a novel stochastic method to determine such overlaps between SRs of different LHC new-physics searches. Also, we introduce a graph theory based method to efficiently find the optimal combination of approximately orthogonal SRs to constrain a given BSM theory. The benefits of the approach are demonstrated by deriving stronger limits on several new physics models of increasing complexity.

Primary authors: BUCKLEY, Andy (University of Glasgow (GB)); FUKS, Benjamin; REYES-GONZÁLEZ, Humberto (University of Genoa); ARAZ, Jack Y. (IPPP - Durham University); YELLEN, James David (University of Glasgow (GB)); WILLIAMSON, Sophie (LPTHE, Sorbonne Université); WALTENBERGER, Wolfgang (Austrian Academy of Sciences (AT))

Presenter: YELLEN, James David (University of Glasgow (GB))

Session Classification: Experience and feedback using reinterpretation material