

Generator tuning on unexploited data

Scientific Achievement

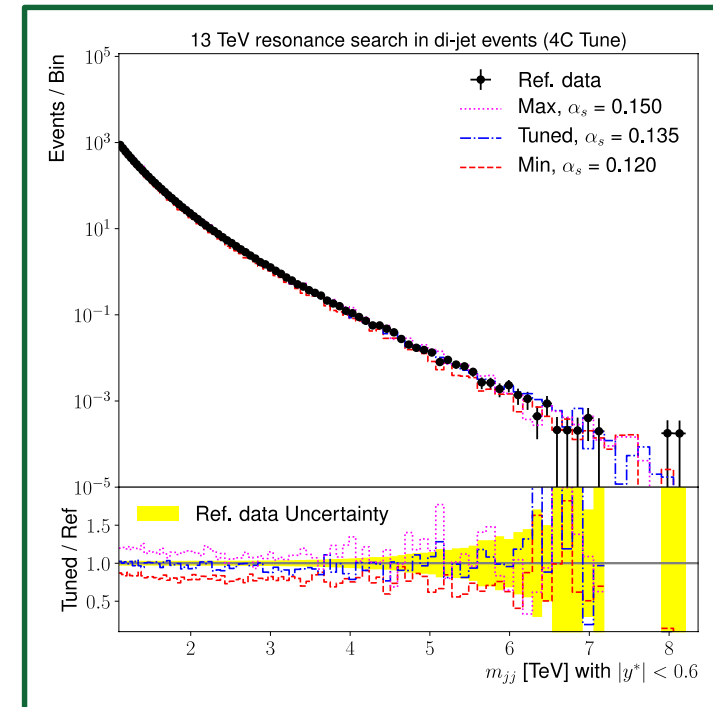
Developed novel automated HPC workflows to tune event generators with search data, expanding the data that can be used for tuning, allowing specialized tunings for new physics searches at the LHC.

Significance and Impact

Greater reach for new physics results because of improved background predictions.

Research Details

- Tuning will be possible on a wider kinematic region using search data.
- Use HPC to generate simulated data, use simple fast simulation to model detector effects, and tune directly to search data.
- The tuned results agree well with the search data (see the plot).
- Proof of principle with fast simulation: use the same HPC workflow to tune the simple fast simulation. A first step towards tuning of Geant4 simulation. Can be extended to provide an LHC search-data based fast simulation tune



Di-jet invariant mass distribution used for di-jet resonance search. Black dots are the observed ATLAS data. Blue line is simulation data after tuning strong coupling constant (α_s), the other two lines are simulation data without tuning.