“UCL” activities in MCnet

"UCL" activities in MCnet

- User activity and Rivet
- MC Development

User activity & Rivet

- Emily Nurse

User activity & Rivet

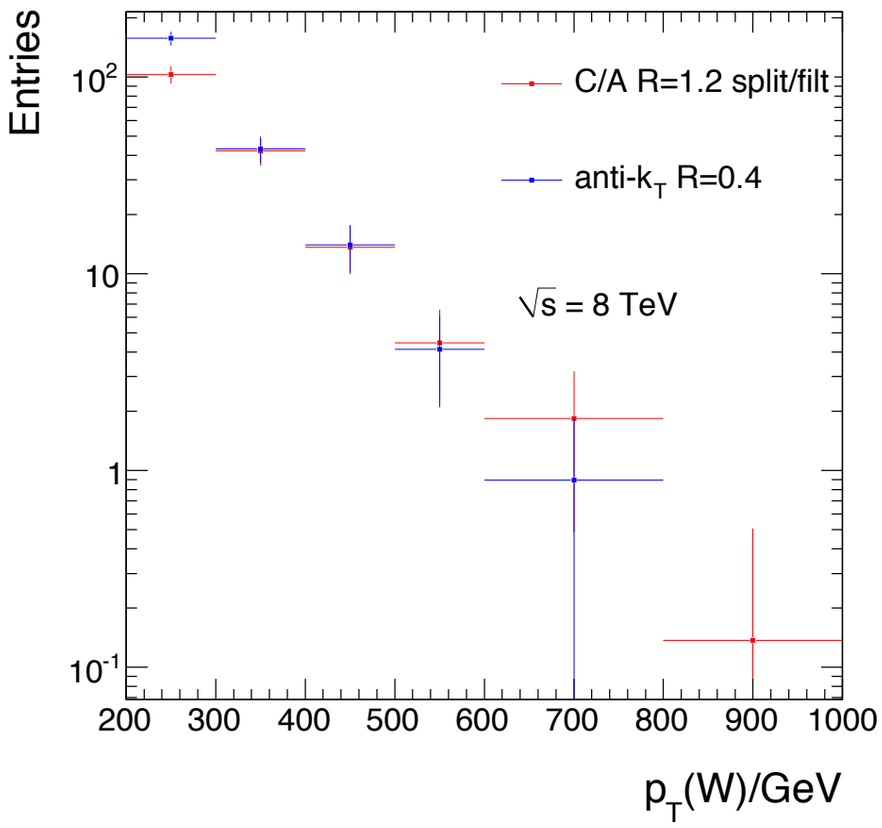
- Emily Nurse… very productive (Zoe Peggy) and gradually returning to MCnet work too now

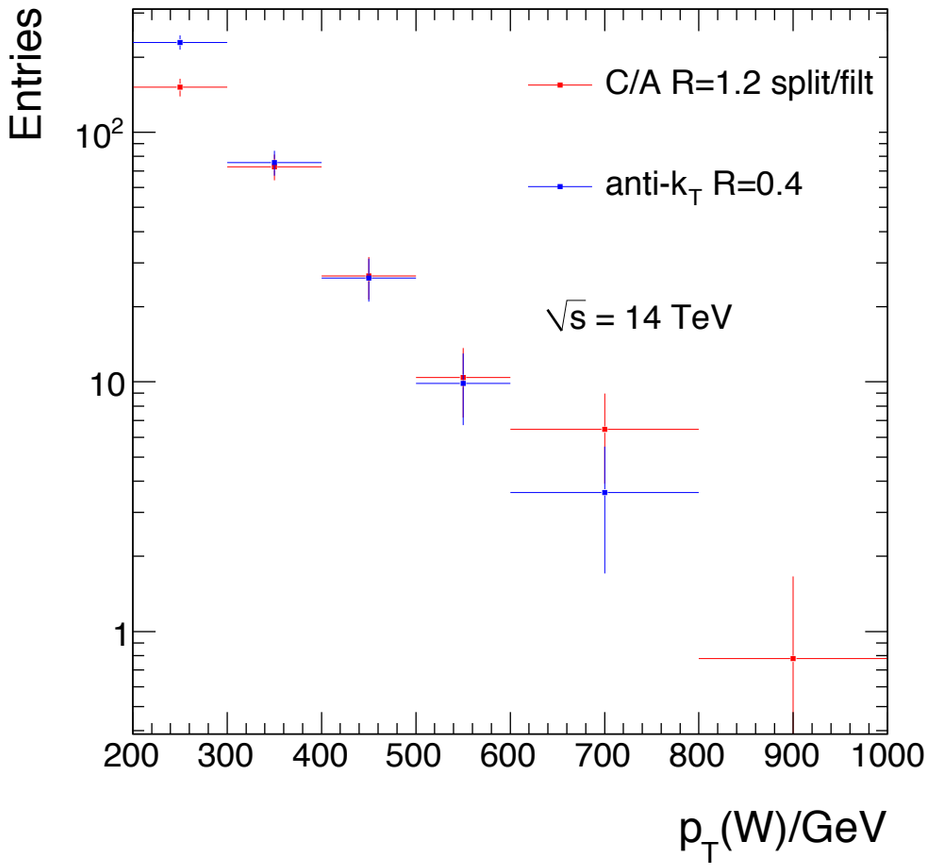
User activity & Rivet

- Gavin Hesketh: Starting to work with Andy Buckley on Simone Amoroso's shortie studentship (implementing correlated uncertainties in tuning, then some heavy flavour stuff)
- Nicola Orlando coming to UCL over the summer to work with Gavin, looking at more heavy flavour in MCs.

User activity & Rivet

- Me/ Inês Ochoa/Tim Scanlon… H -> bb studies
  - WH, aMC@NLO/Herwig++, Rivet
  - Compare C/A subjets with anti-KT R=0.4



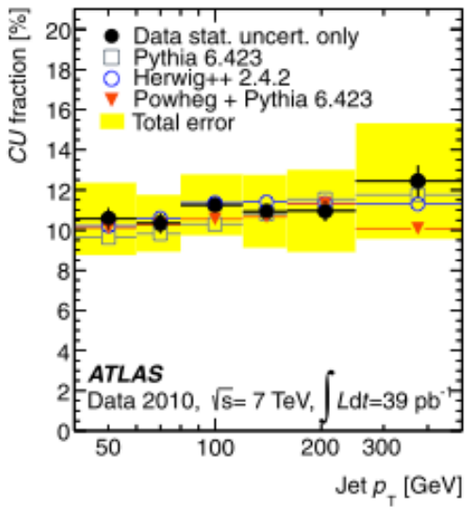


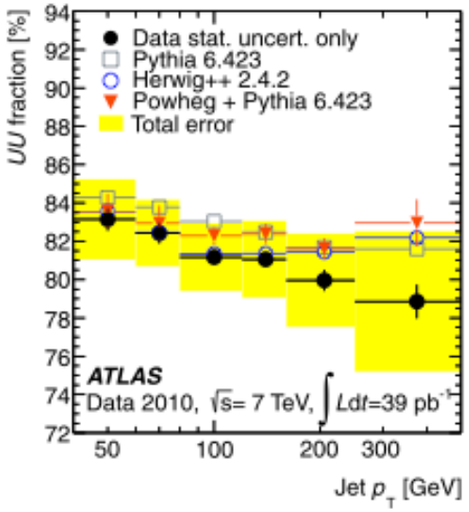
User activity & Rivet

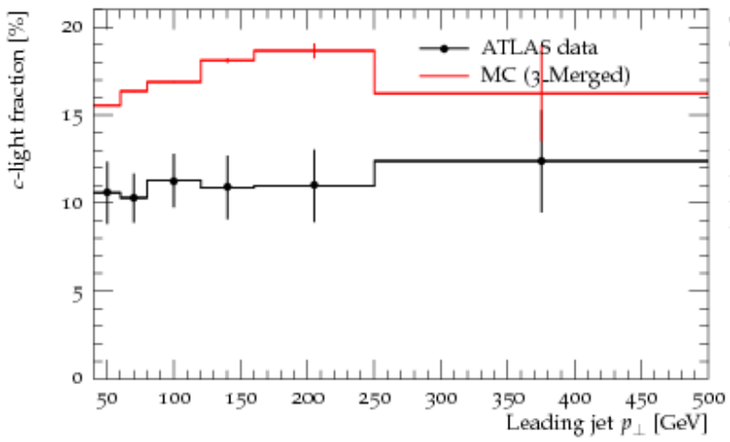
- Me/Ben Waugh/Evgeny Savin & Jayson Marmar (undergrad project students)
  - Sherpa 2, dijet flavours (JM)
  - MPI (ES)

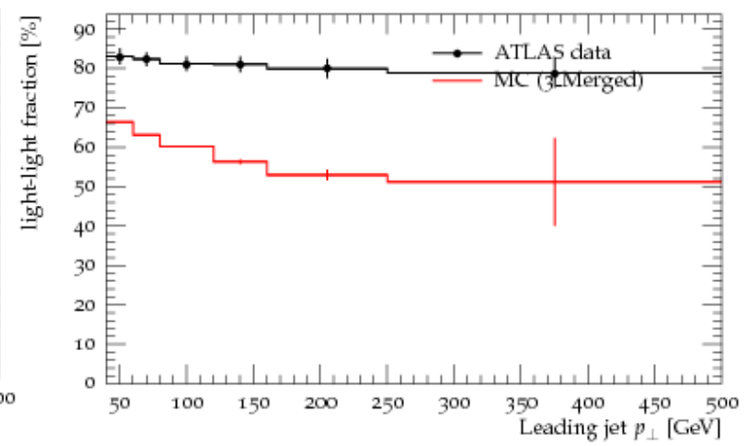
MCnet ATLAS paper

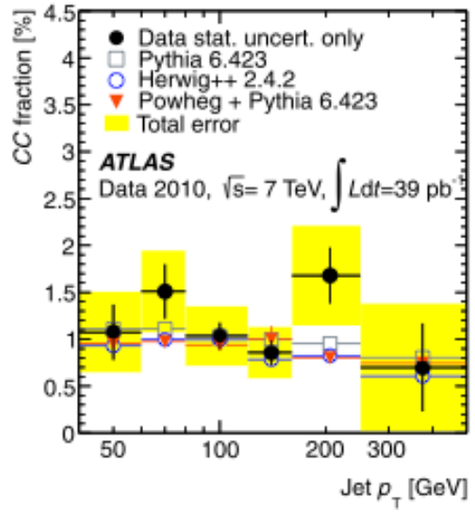
Sherpa (2m events)

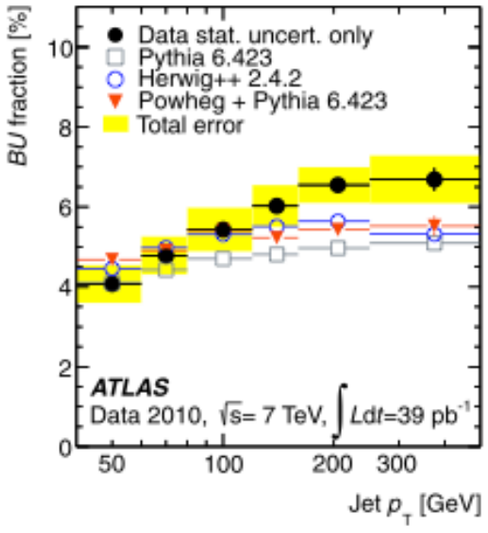


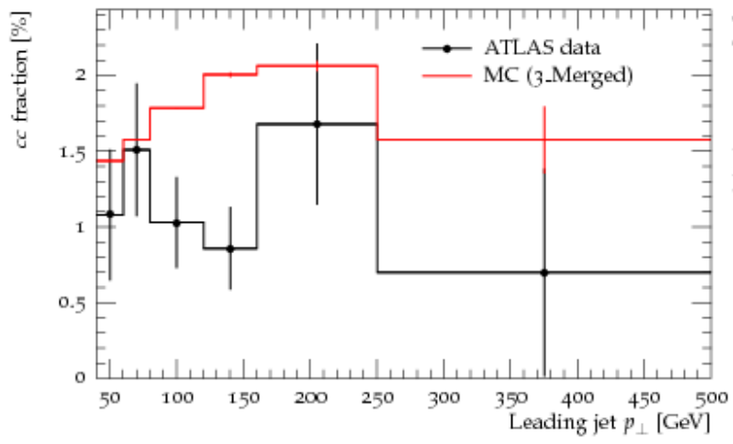


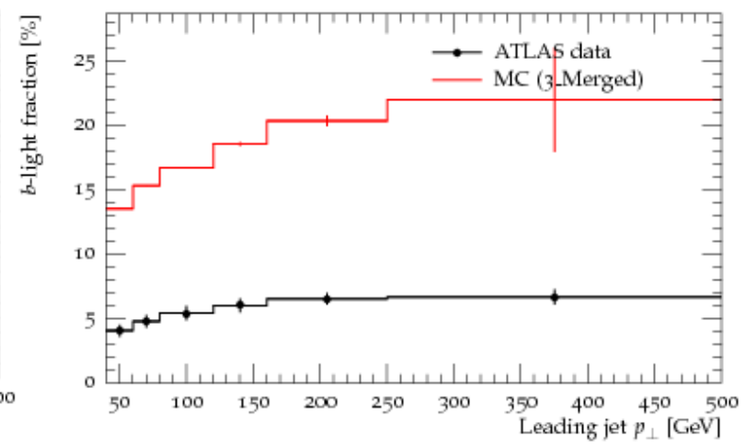


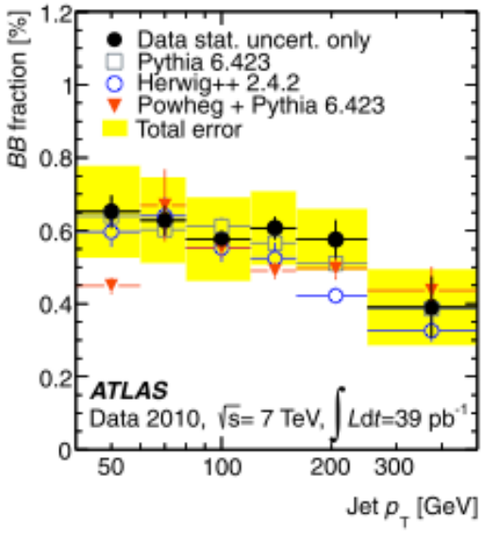


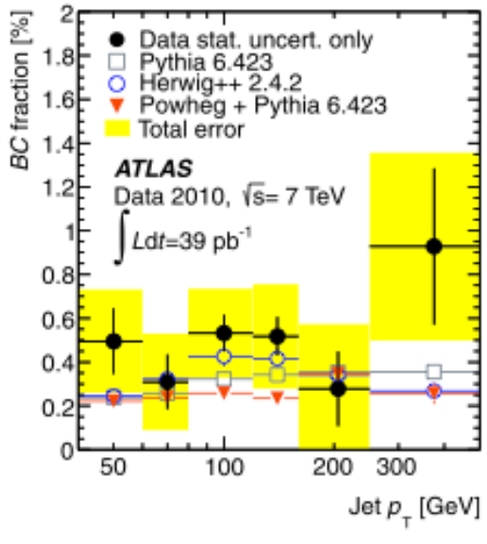


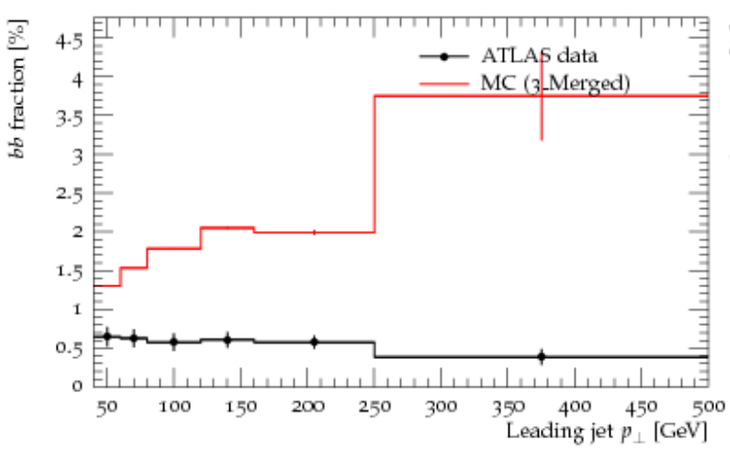


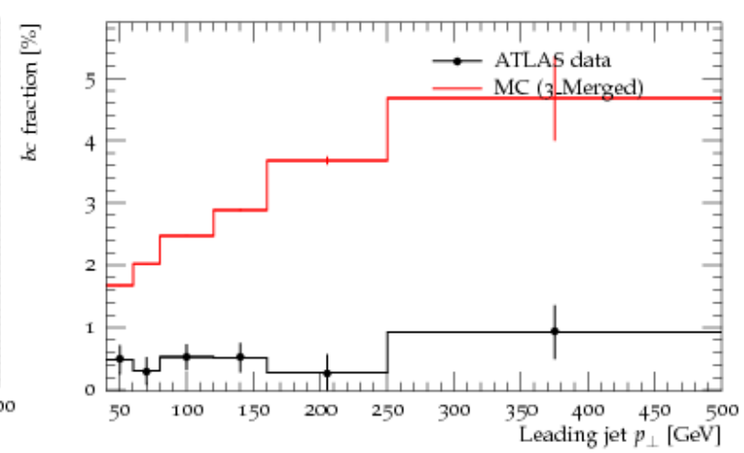










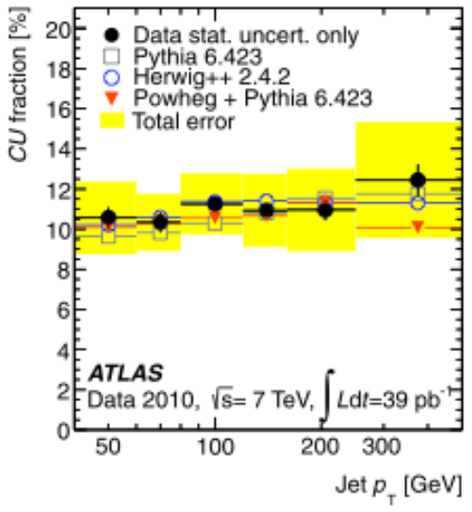


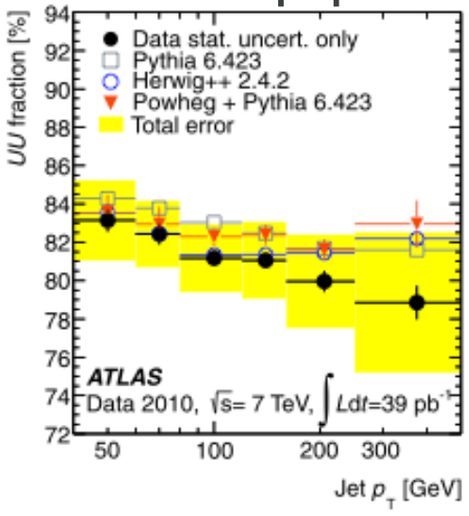
MCnet

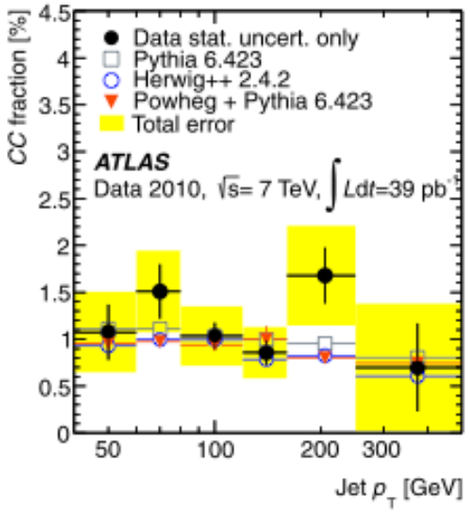
UCL

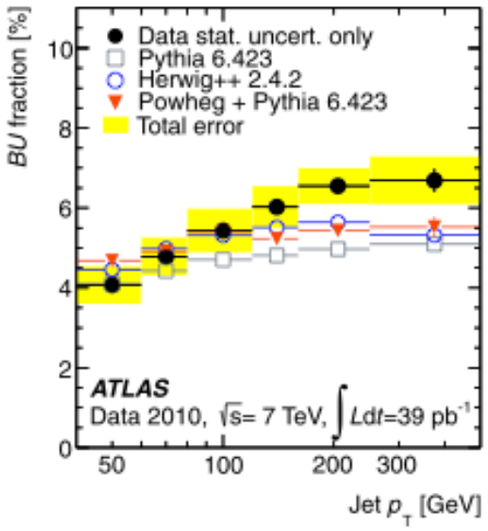
Sherpa (2m events)

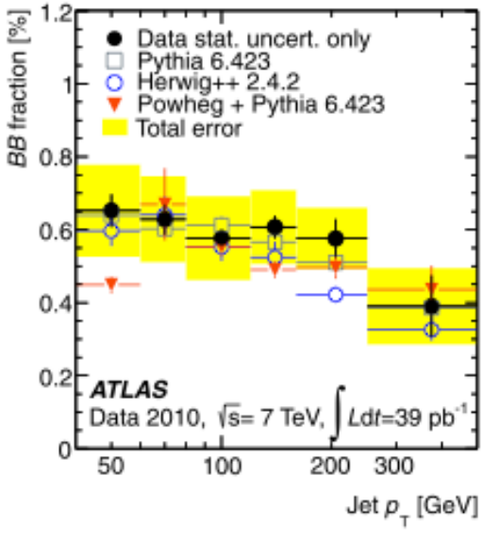
ATLAS paper

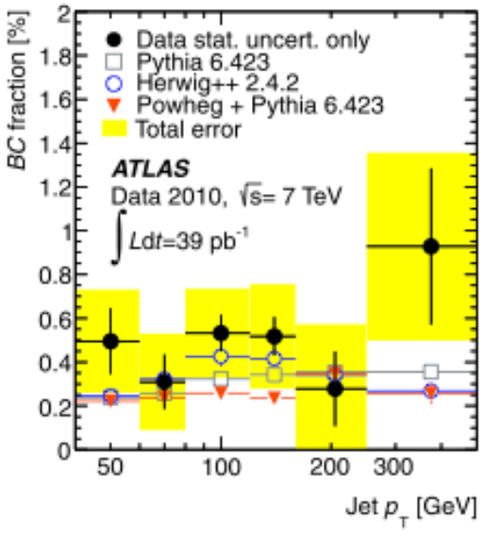


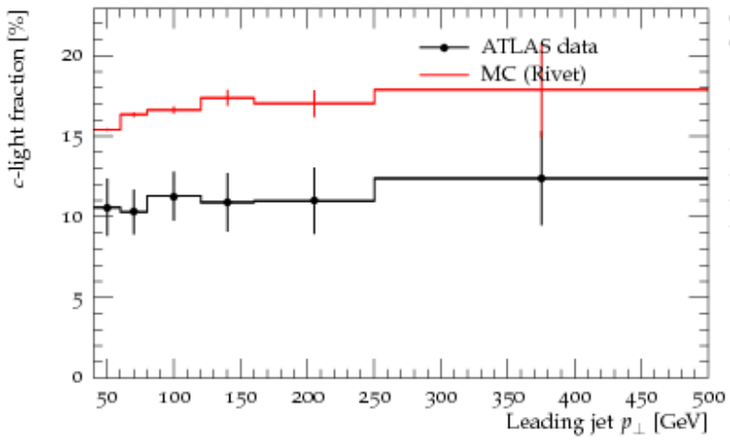


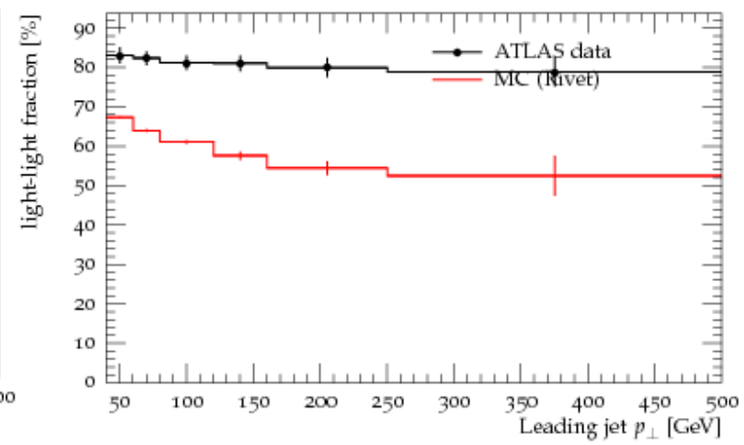


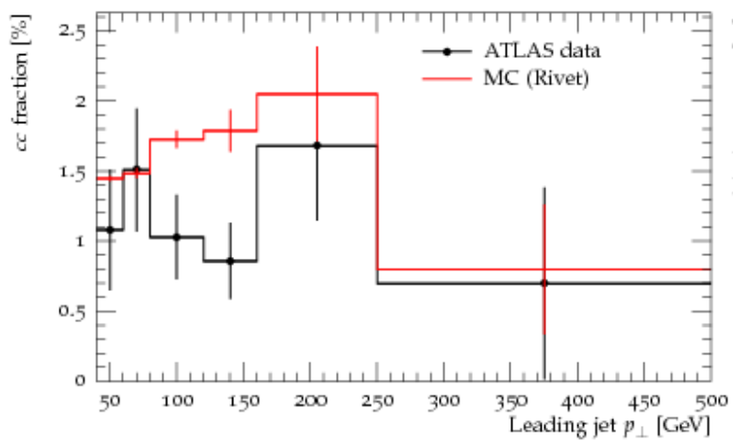


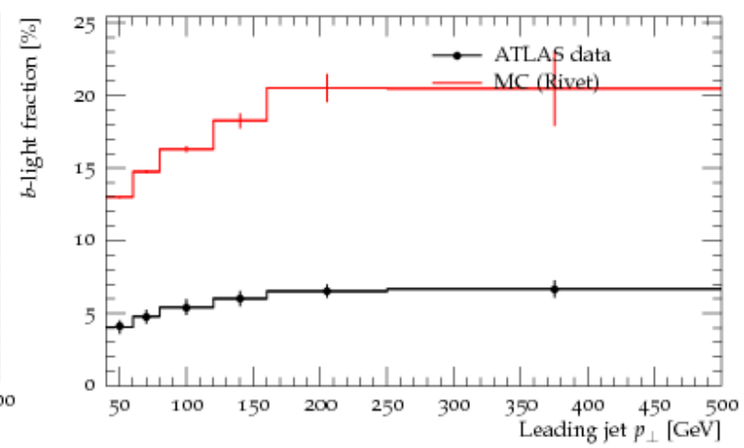


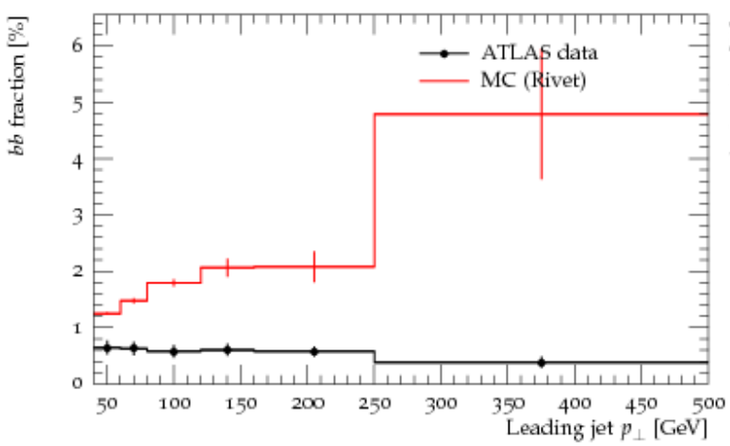


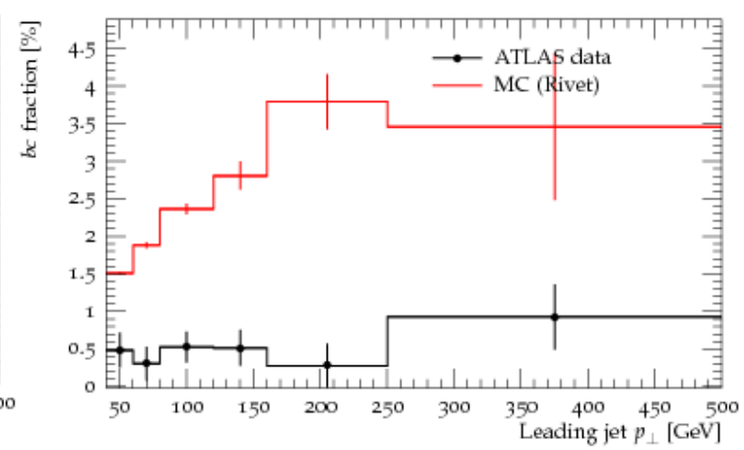




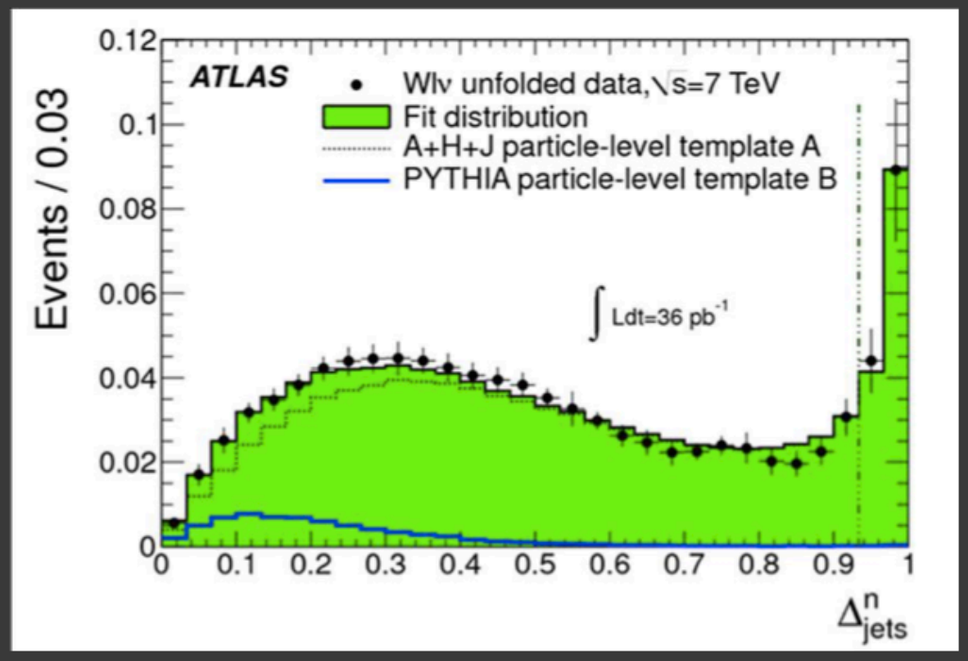


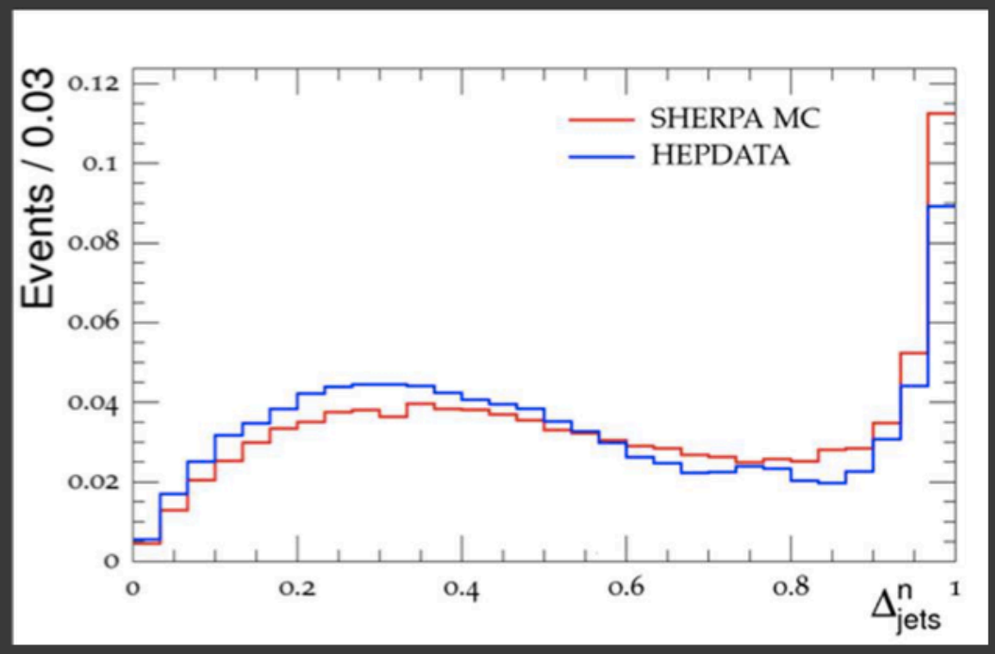


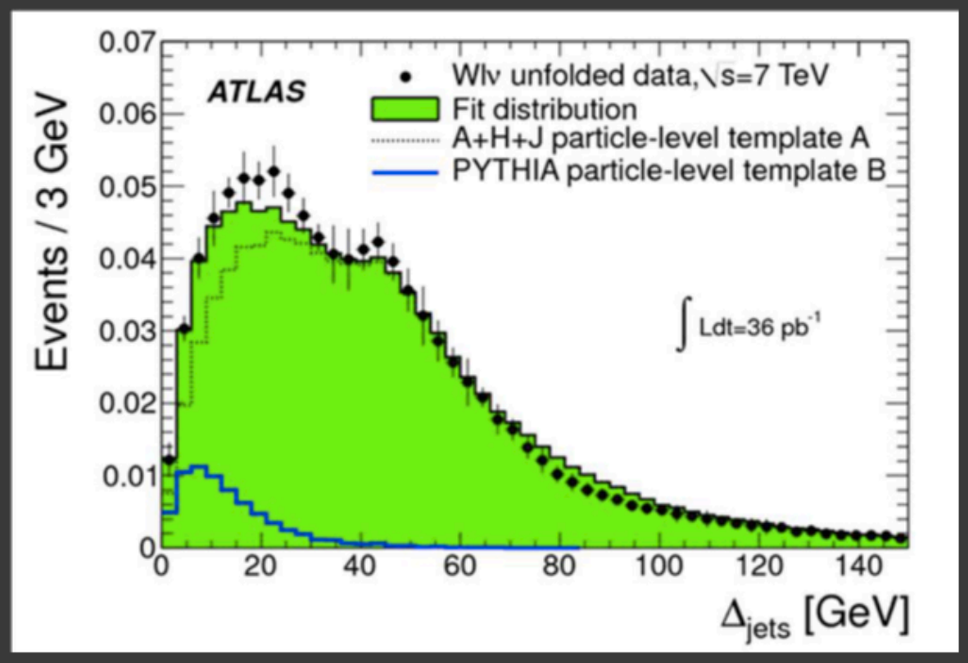


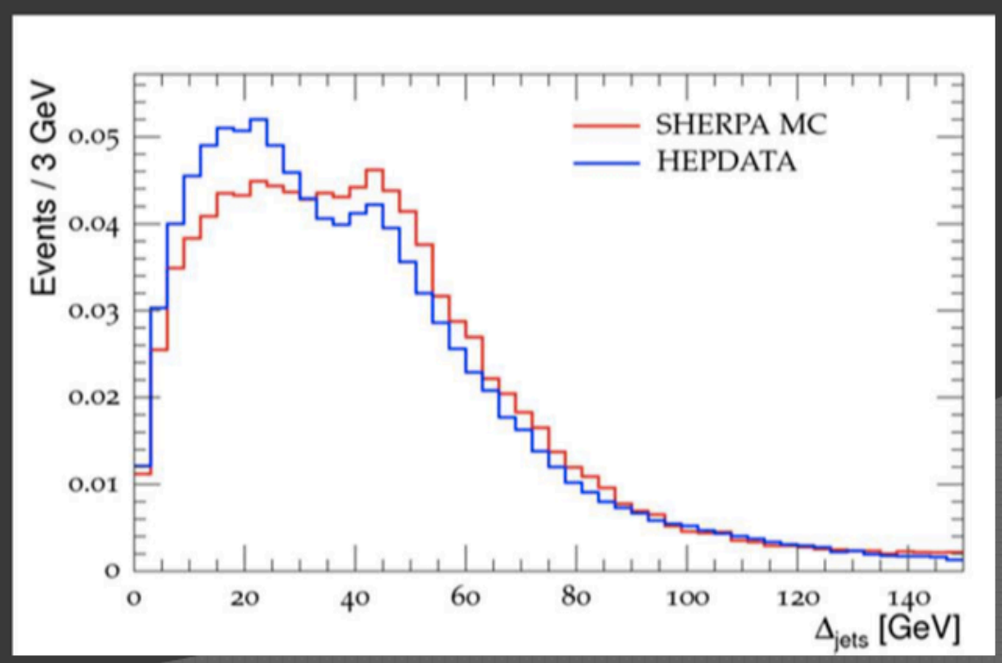


Rivet Routine for W(->lv) + 2-jet events









User activity & Rivet

- Lots of Rivet development & maintenance, Andy Buckley et al (Glasgow, Durham, liaisons within the experiments)
- HEPDATA: Durham – discussion later.

UCL MC development

Keith Hamilton,
new Mcnet PhD student Stefan Richer

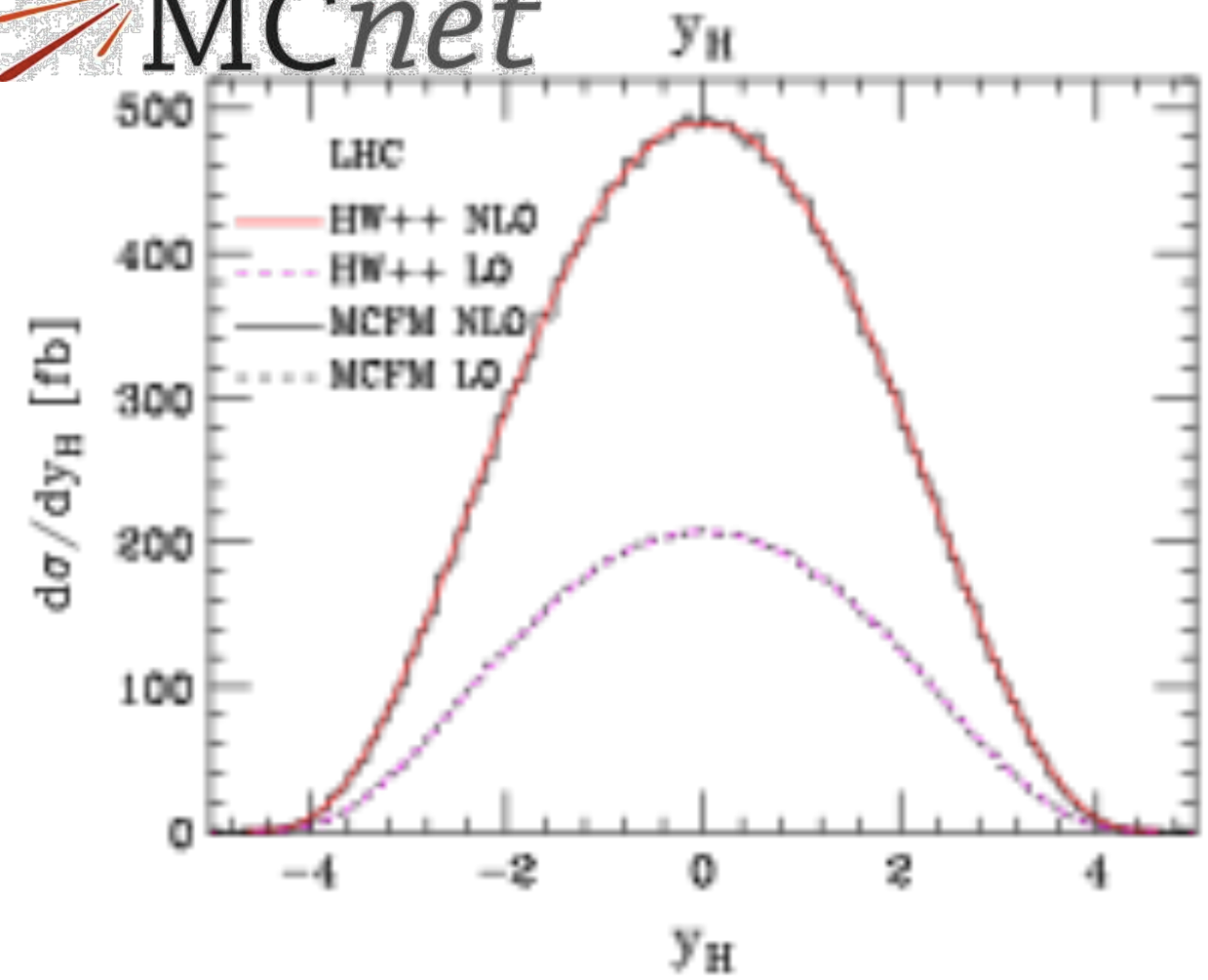
- UCL's work in MC development includes ...

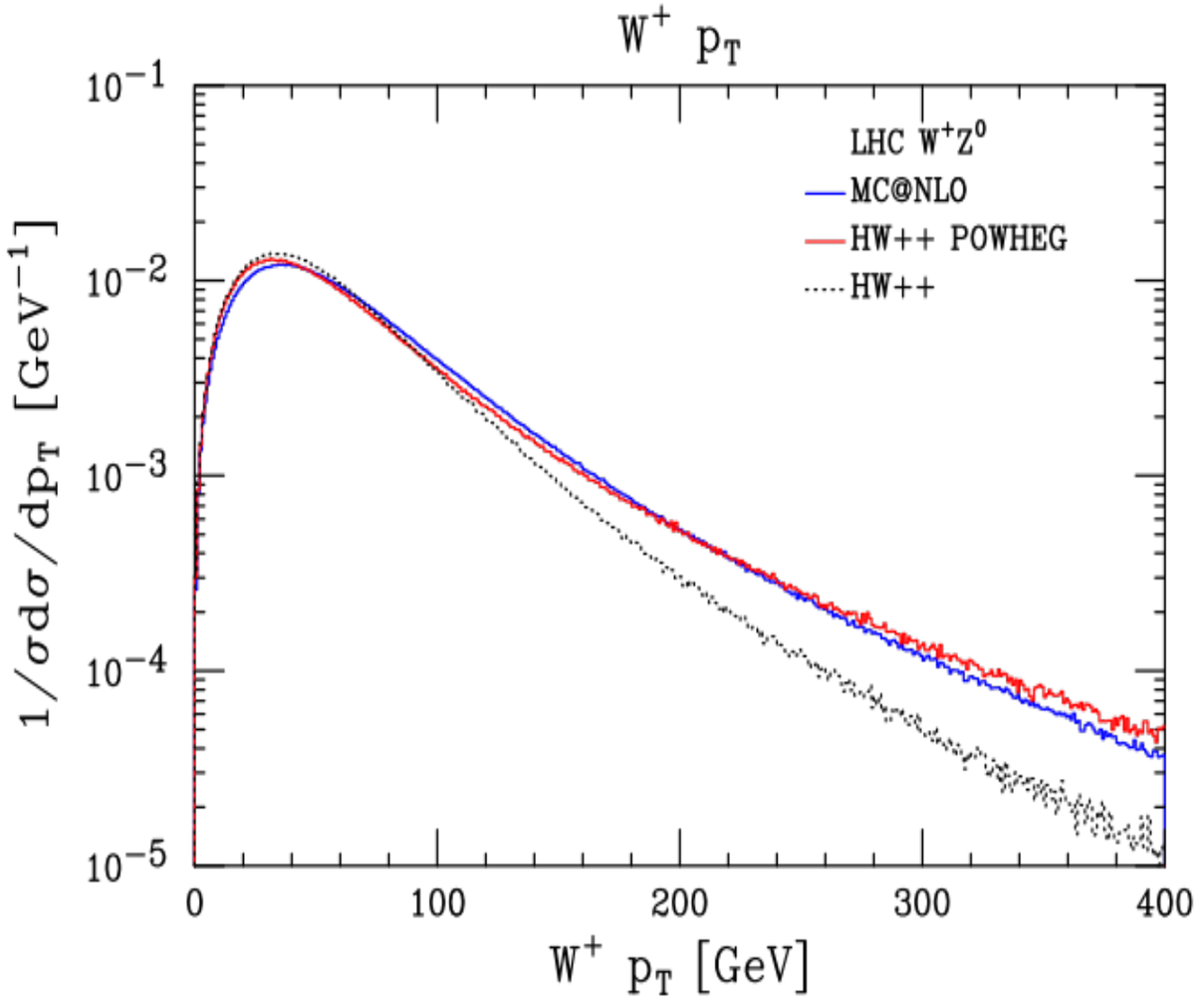
1. Substantial contributions to the Herwig++ generator

2. Powheg-Box NLO+parton shower [NLOPS] code framework

3. New methods for inclusion of higher order corrections to take MCs and the related calculations to the next levels of precision

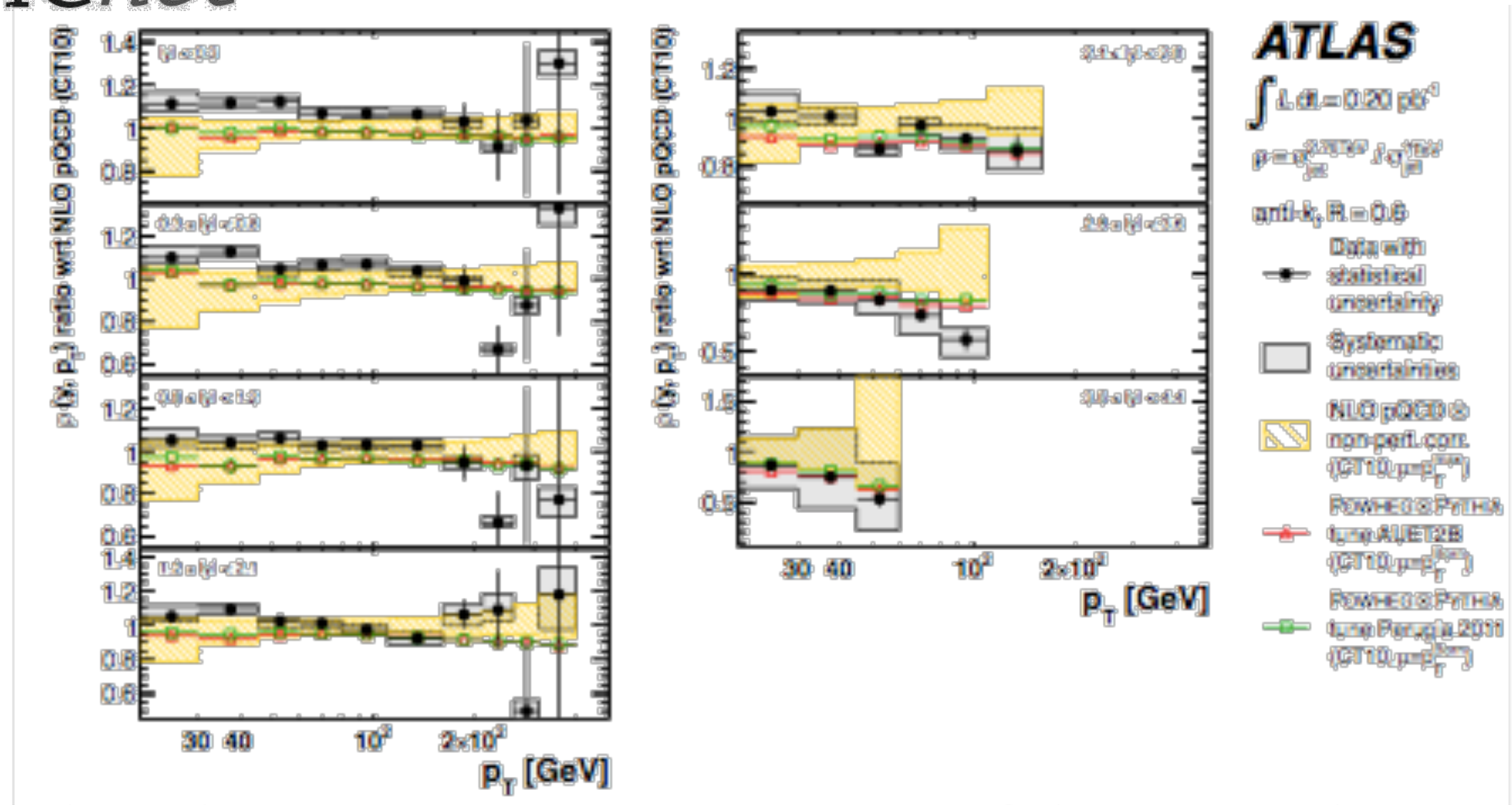
1. The Herwig++ generator



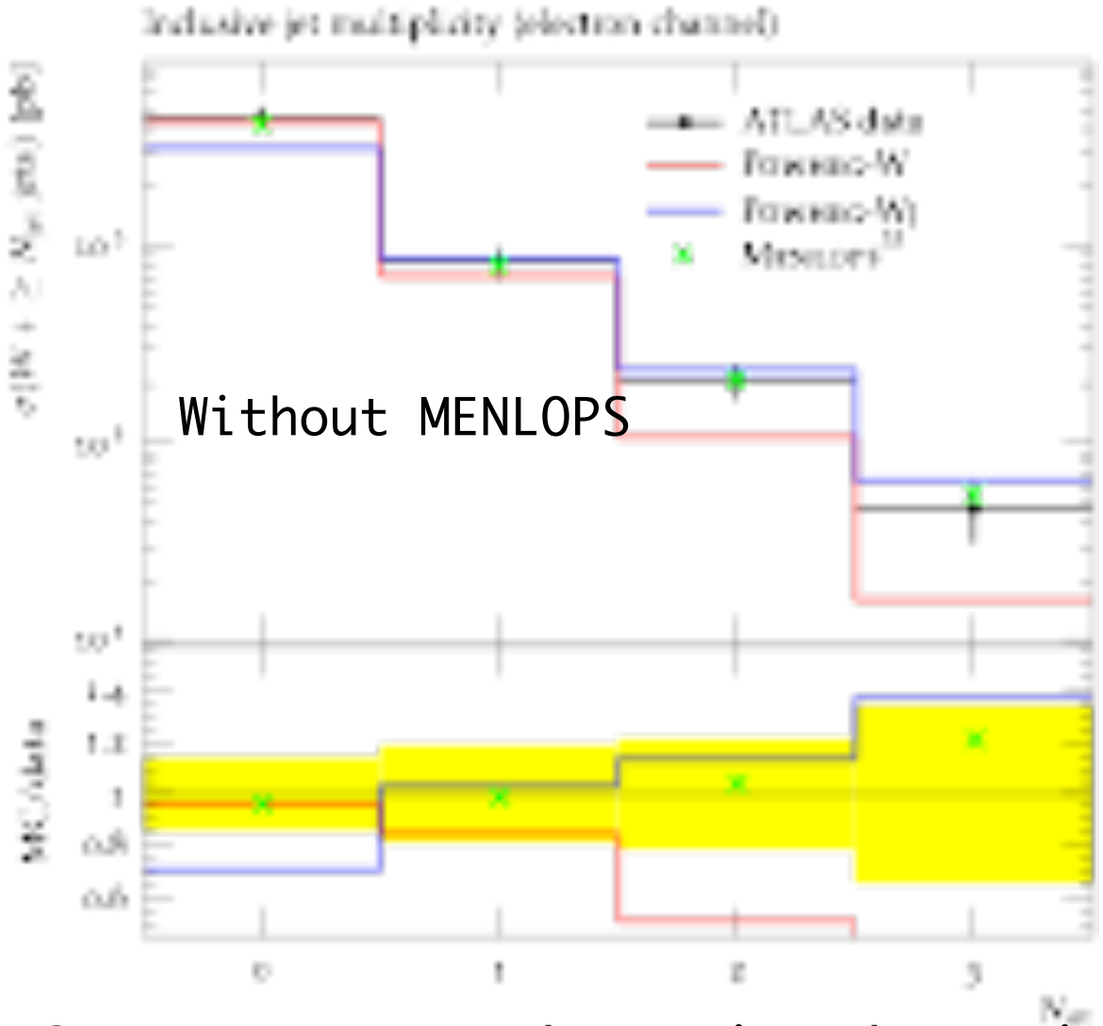


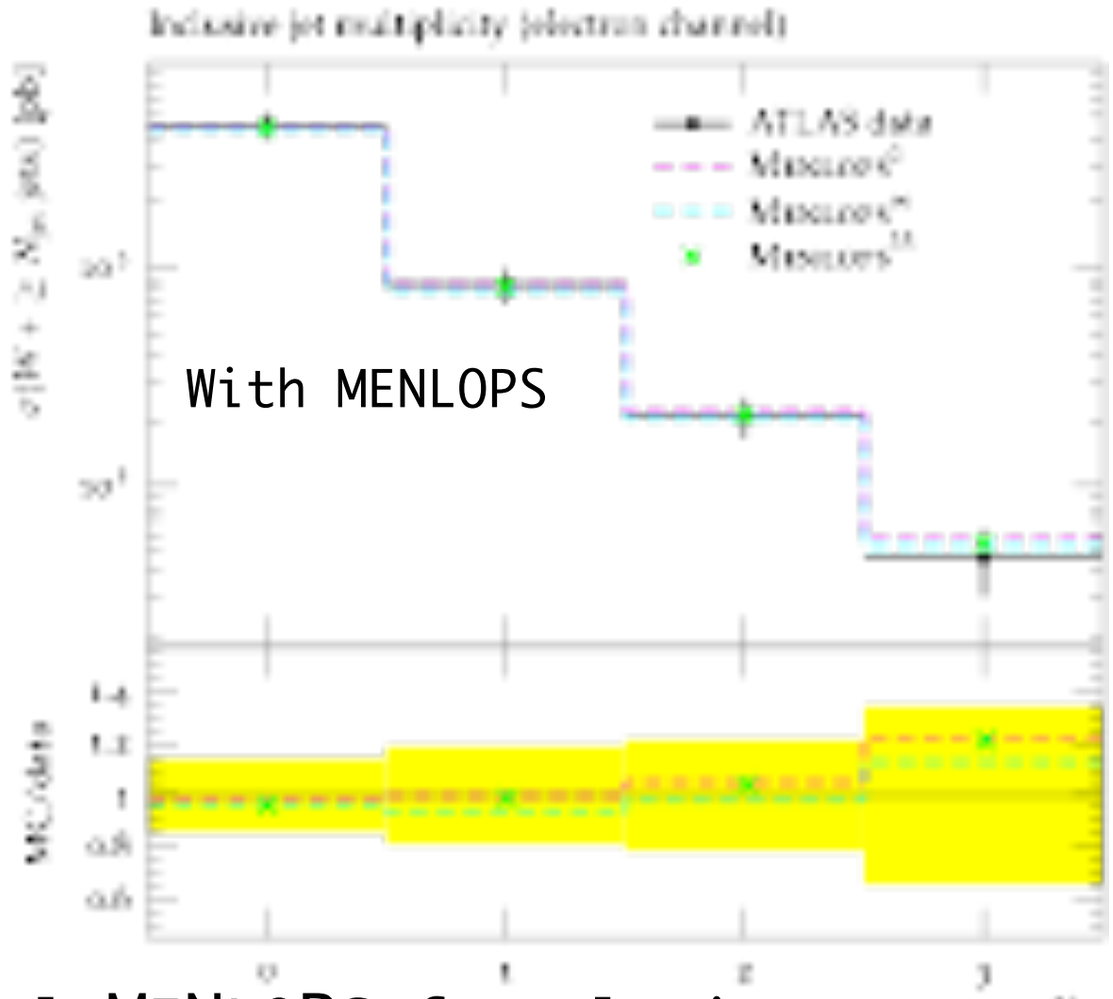
- UCL helped develop some of the 1st POWHEG [NLO+PS] simulations
- These are still the only truly 'full' POWHEG simulatⁿs
  [they have the angular ordered truncated shower mandated by QCD colour coherence]
- Past involvement in Herwig++ Underlying Event simulation via JIMMY, but now only involved in tyuning, not code development

2. The Powheg-Box NLOPS toolkit



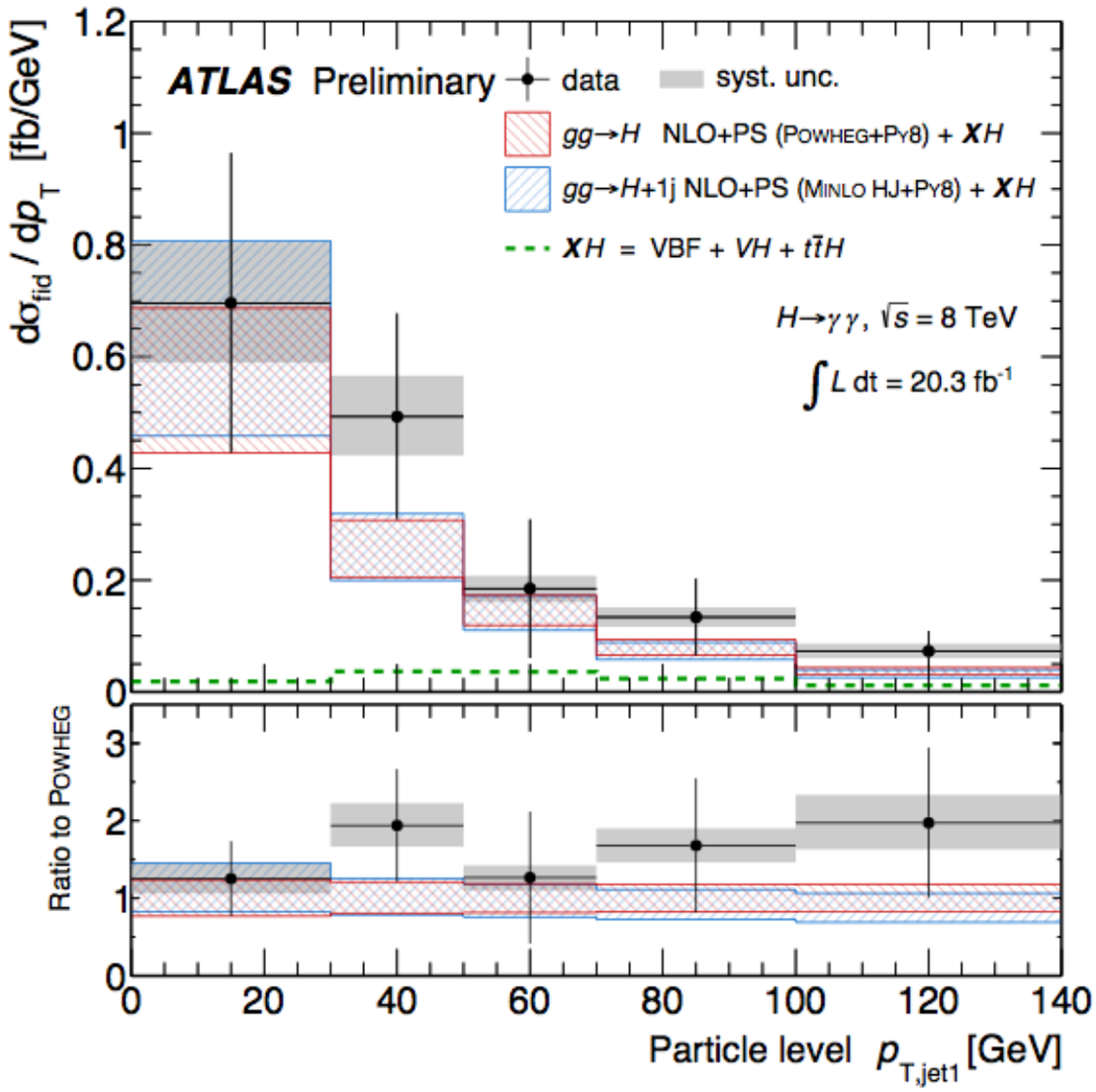
- UCL did major work on the 1st NLO+PS MC of jet production
- Also Powheg-Box W+jet
- Other contributⁿs include a reweighting facility for th.uncertainty determinatⁿ & more significant theoretical progress ➞

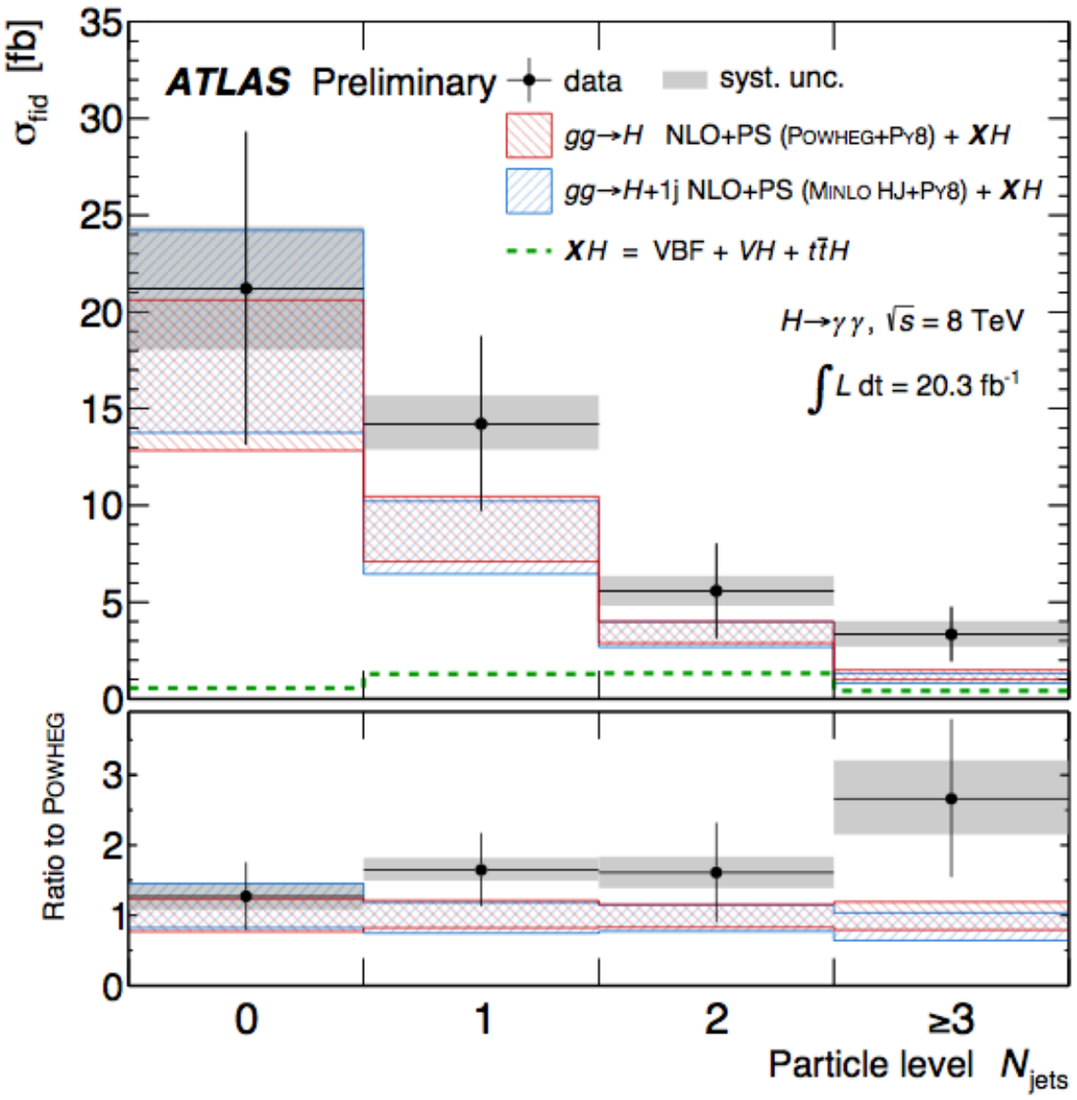




- UCL were co-authors in the original MENLOPS formulation
- MENLOPS combines NLO + parton shower matching techniques w. the complementary multi-jet matrix element + parton shower approach

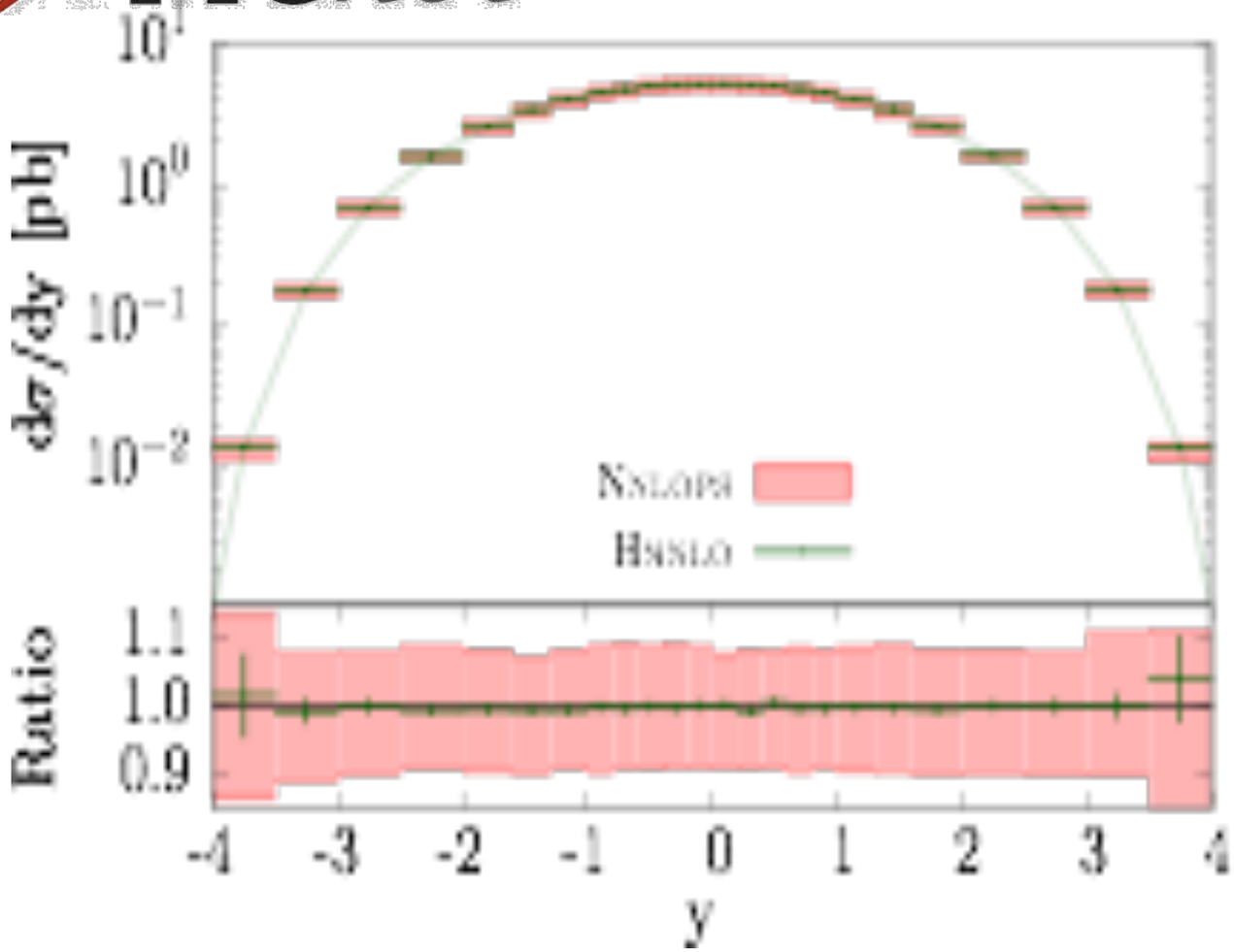
3. New MC Methods: Multiscale improved NLO

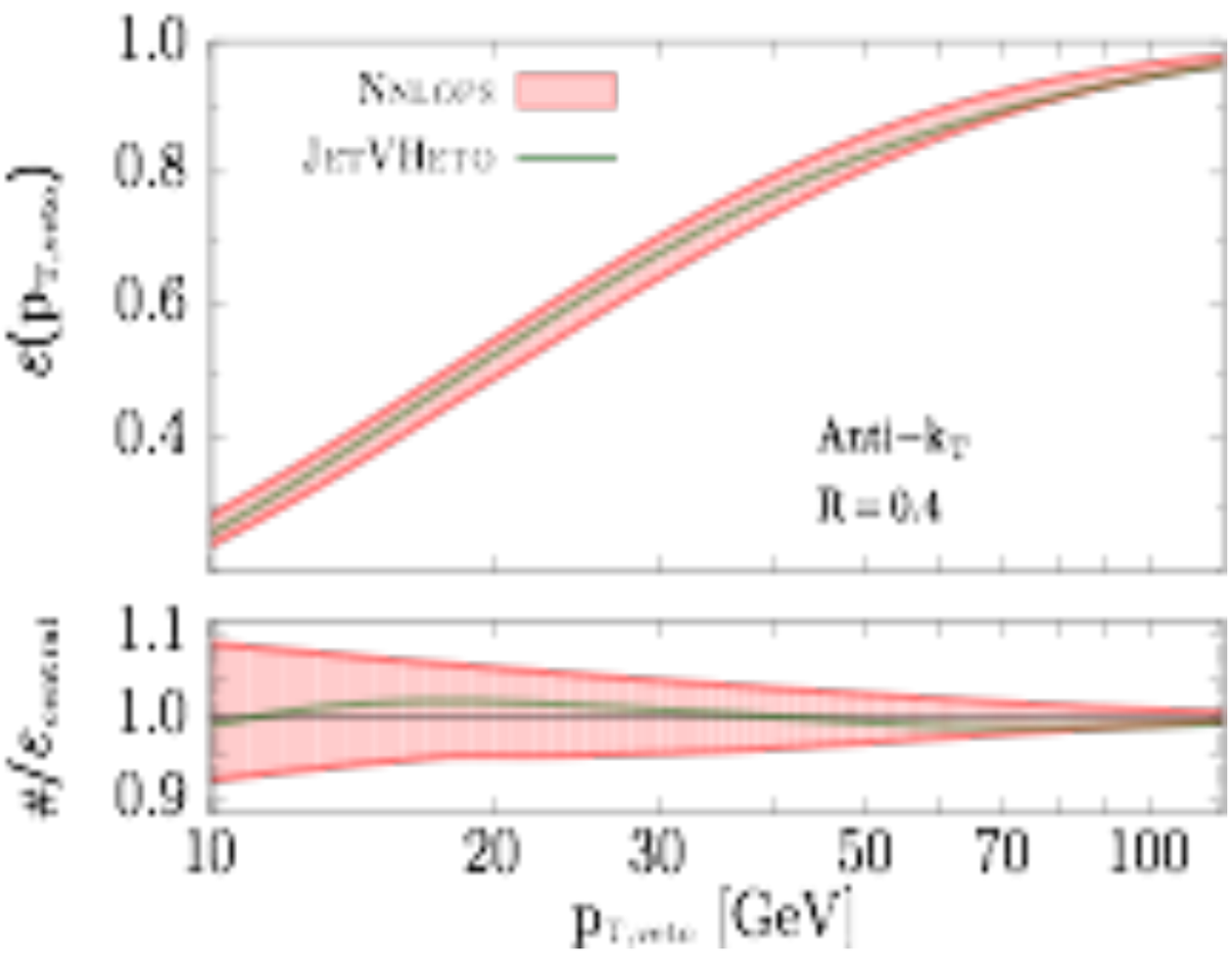




- UCL contributed to formulating Multiscale improved NLO: MiNLO
- MiNLO is a physically motivated scale setting procedure based on parton shower resummation, improving inclusive NLO calcs w. beyond-NLO corrections
- MiNLO H+jets codes are state-of-the-art & used by ATLAS [see above]

3. New MC Methods: NNLOPS





- UCL co-developed the world's first NNLOPS simulation
  This level of accuracy in MC is, for now, unmatched.
- Simulation is based on a refined version of a MiNLO calculation
- The code is public at http://powhegbox.mib.infn.it

- Others (not core MCnet but generally working on related things…)

1. ATLAS: Mario Campanelli, Ben Cooper, Becky Chislett, Kristian Gregersen, Christian Gutschow, Josh McFayden… others
   James Monk: ATLAS MC coordindator, now Copenhagen, still very involved.

2. Theory: PDFs, SUSY & BSM models… Robert Thorne, Patrick Motylinski, Julia Harz, Frank Deppisch…

- Future plans

1. Continue (and hopefully increase) Rivet maintenance and development work, tuning & validation, liaison with experiments

2. Would be good to think more about HEPDATA and MCPlots

3. Continue contributions to Herwig++, Powheg-Box, NLOPS, higher order precision methods