

Alexander Mitov

Cavendish Laboratory

South-East UK QCD and collider phenomenology meeting  
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# Precision QCD applications for the LHC

- ✓ Amplitudes
  - ✓ 2->3 scattering (massless and masses)
- ✓ NNLO cross sections for a wide variety of processes
  - ✓ Jets: 2 and 3 jets,  $W+c$ , jets + photons
  - ✓ Vector bosons
  - ✓ Top pair production and decay
  - ✓ Heavy flavor fragmentation
- ✓ A public database with ready to use predictions

## ✓ HighTEA

Centre for Precision Studies in Particle Physics

Research People Results Top+ HighTEA Opportunities ILC physics

high tea HighTEA

(High-energy Theory Event Analyzer for collider processes)

- Publication (to appear)
- For the impatient: running HighTEA via Jupyter Notebook on Google Colab

*The modern way of doing physics*

This site is the public face of a novel approach for distributing and analyzing the results of fixed order NNLO calculations for LHC processes. Here are the main topics:

- The basic idea
- How it works
- Features
- Ways to access the library
- Our team
- Disclaimer

The basic idea

The idea behind HighTEA is very simple: existing calculations use Monte Carlo (MC) methods to integrate over the available phase space. Such MC samplings, called events, are usually binned in histograms and then discarded.

While very powerful, such an approach to doing high-precision NNLO calculations has a serious drawback: it lacks

CAVENDISH HEP SEMINAR

Tue 02 May 11:00: The Force Awakens: searching for new sources of CP violation in the electroweak sector

JOINT CAVENDISH-DAMTP SEMINAR

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OUR RESEARCH RECEIVES FUNDING FROM:

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European Research Council  
Established by the European Commission

## ✓ Current members

**Terry Generet**  
(joined 2023)

## Recent former members (Left 2023)

**Rene Poncelet**



Faculty, Cracow

**Bayu Hartanto**



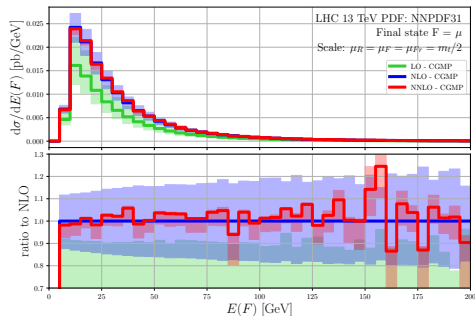
Junior group leader, Korea

# Terry Generet

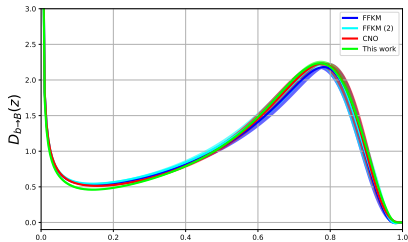
- Previously (PhD) at RWTH Aachen University
- Now (postdoc) working with Alex Mitov
- Research interests:
  - Higher-order calculations (numerical and analytic)
  - Subtraction schemes (STRIPPER)
  - Resummation (collinear mass logs, soft-gluons)
  - Fragmentation (perturbative and non-perturbative, decay)
  - Heavy-quark production (top and bottom so far)

# Some results

- A  $B$ -hadron fragmentation function fit (arXiv:2210.06078)



- The  $t \rightarrow H$  and  $g \rightarrow H$  fragmentation functions (arXiv:2106.06516)



- $pp \rightarrow t\bar{t} + X \xrightarrow{z} B + X' \rightarrow \mu + X''$ :  
muon energy-distribution

