

Latest RIVET developments in ALICE

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Introduction

RIVET is a standardised tool to compare experimental results to Monte Carlo simulations.

- Easy to learn and master
- Compatible to generators with HepMC outputs
- Fast, reliable and suitable for multiple subjobs

Many articles need to be *rivetised*, converting their cuts and analysis procedures in the framework → great opportunity for new learners from all experiments.

Rivet analyses exist for 1121/5756 papers = 19%. 216 priority analyses required.

Total number of Inspire papers scanned = 9803, at 2022-09-28

Breakdown by identified experiment (in development):

15/11/22
from RIVET website

Key	ALICE	ATLAS	CMS	LHCb	Forward	HERA	e ⁺ e ⁻ (≥ 12 GeV)	e ⁺ e ⁻ (≤ 12 GeV)	Tevatron	RHIC	SPS	Other
Rivet wanted (total):	290	337	465	180	17	476	703	513	1118	477	56	3
Rivet REALLY wanted:	36	39	92	15	0	15	1	1	9	2	5	1
Rivet provided:	29/319 = 9%	190/527 = 36%	104/569 = 18%	17/197 = 9%	8/25 = 32%	34/510 = 7%	192/895 = 21%	347/860 = 40%	58/1176 = 5%	8/485 = 2%	4/60 = 7%	131/134 = 98%

Latest results and implementation of self-normalised multiplicity estimators

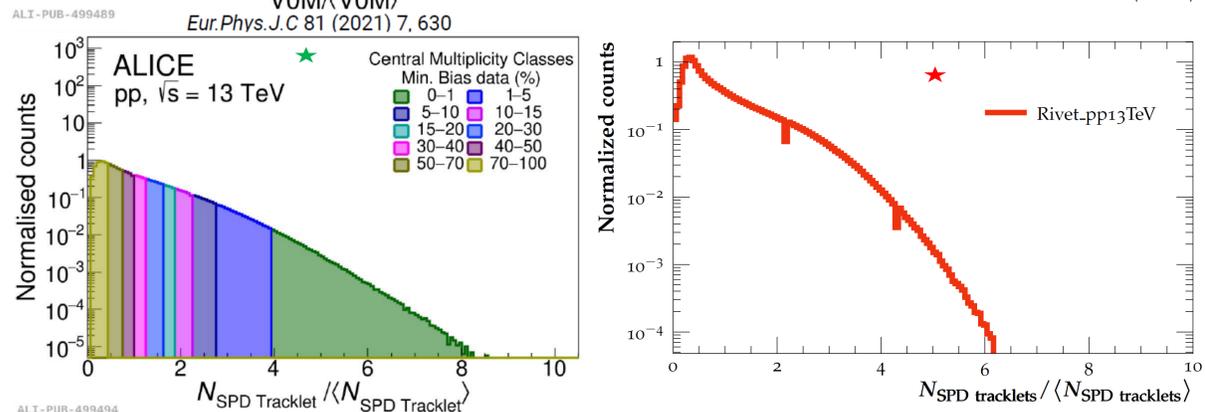
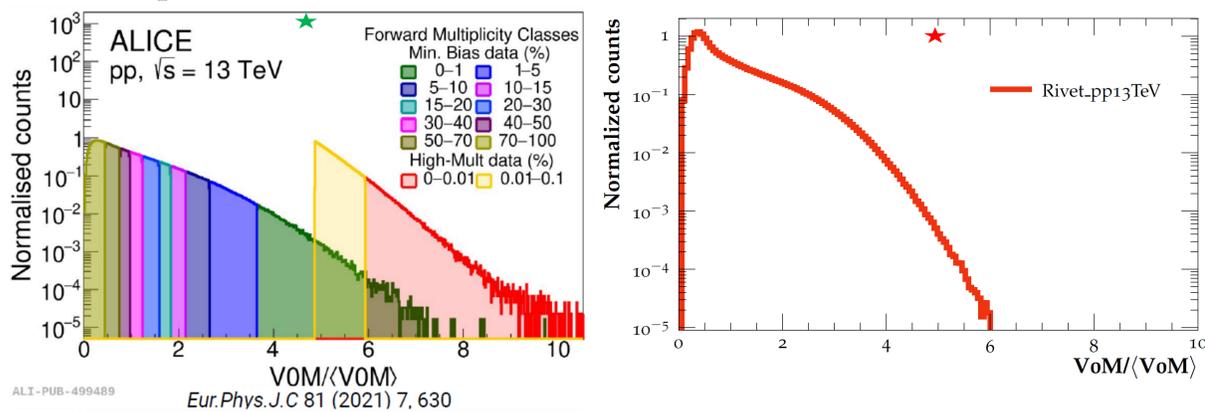
Two of the latest ALICE papers *rivetised* are:

- K⁰_s and (anti-)Λ-hadron correlations in pp collisions at √s = 13 TeV [Eur. Phys. J. C 81 (2021) 945, 2021] → >180 plots!★
- D mesons in Pb—Pb at √s = 5.02 TeV [JHEP 10 (2018) 174, 2018] → R_{AA} plots combining simulations with pp and Pb—Pb collisions.★

Missing functionalities of RIVET initially prevented us from *rivetising* new analyses → Private implementation of self-normalised multiplicity estimators based on:

- V0M detector amplitude → V0M / <V0M>
- Number of SPD tracklets → N_{SPD} / <N_{SPD}>

Both quantities are now well reconstructed as shown in the comparison between published results★ and RIVET ones with PYTHIA8.★

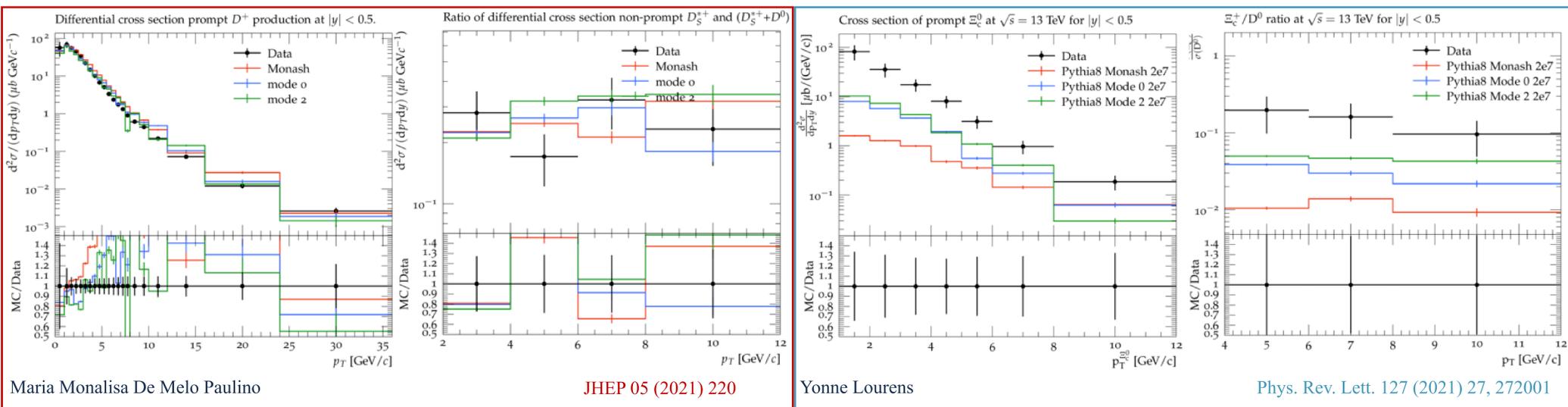


Summer Students 2022

The versatility of the framework makes it a great educational tool, even for students approaching for the first time physics analysis. Multiple pros to start now:

- Improvement of C++ and Python skills
- Increase familiarity with common analysis practice in the experiments
- Learning how to easily run MC simulators using the HepMC data output

ALICE analyses *rivetisation* was the project subject for two summer students at CERN who were able, in less than two months, to achieve comparison results with PYTHIA8 with different tunes. The D mesons and E_c analyses will soon be uploaded in the RIVET website.



LHCC poster session
CERN 29/11/2022

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