2022年5-8月研究生考核报告

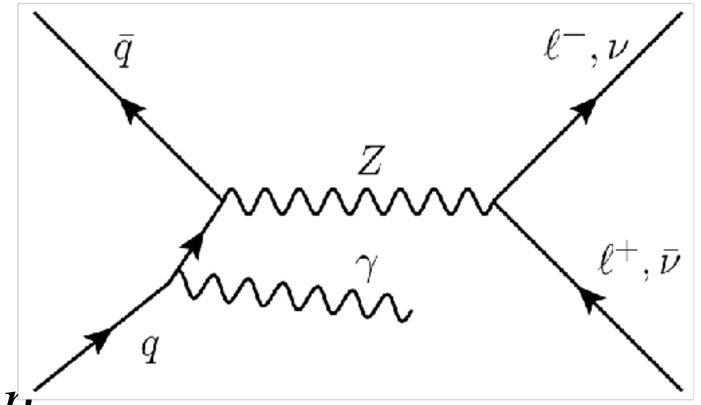
学生：李淑琦

导师：梁志均

2022. 9. 2

Zgamma+jets 分析

介绍



- 测量 p p → Z(ll)gamma + jets fiducial 微分截面
- 方法：Unfolding
- 变量：QCD variables (1D Unfolding)：$m_{jj}, nJets, m_{ll\gamma}, p_T^{\gamma}, p_T^{ll}$ ...
  Polarisation variables (2D Unfolding)：$cos\theta_{CS}$ / ϕ_{CS} in 5 bins of p_T

分析状态

- 已发表会议文章CONF Note:

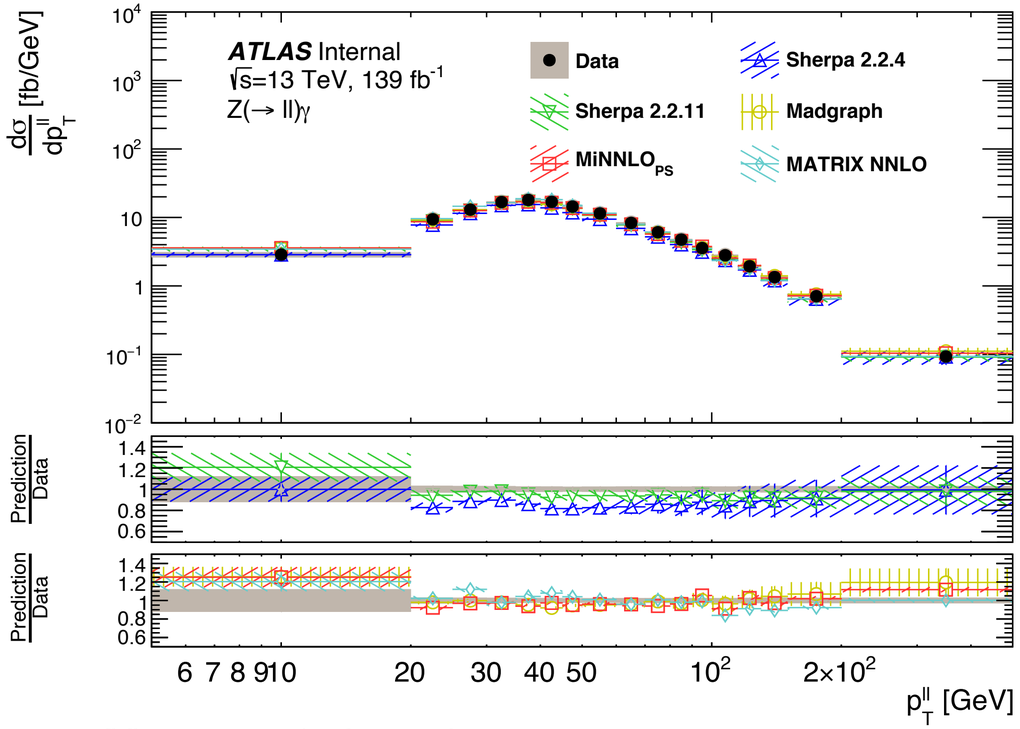
https://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/CONFNOTES/ATLAS-CONF-2022-047/

主要完成的工作：

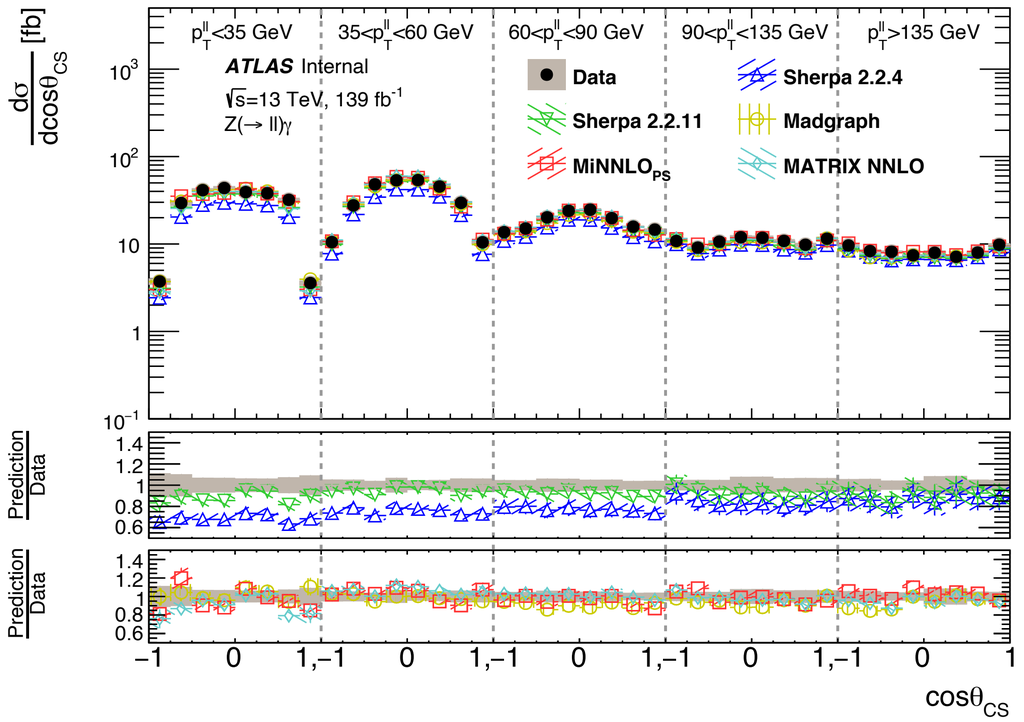
- Unfolding，系统误差的研究，Data与其他理论预测的比较, support note editor, Rivet routine
- ATLAS paper approval meeting 报告

Results -- Comparison with different predictions

- Generators compared: Sherpa 2.2.4 (LO) and 2.2.11 (NLO), MadGraph (NLO), MiNNLO$_{PS}$, MATRIX NNLO
- Sherpa samples underestimate the total cross section
- Sherpa 2.2.11 NLO better describe the shape



angular variables using **2D Unfolding** method



- Differential distribution can

  test of parton density function, parton shower prediction

  test fixed-order QCD calculation

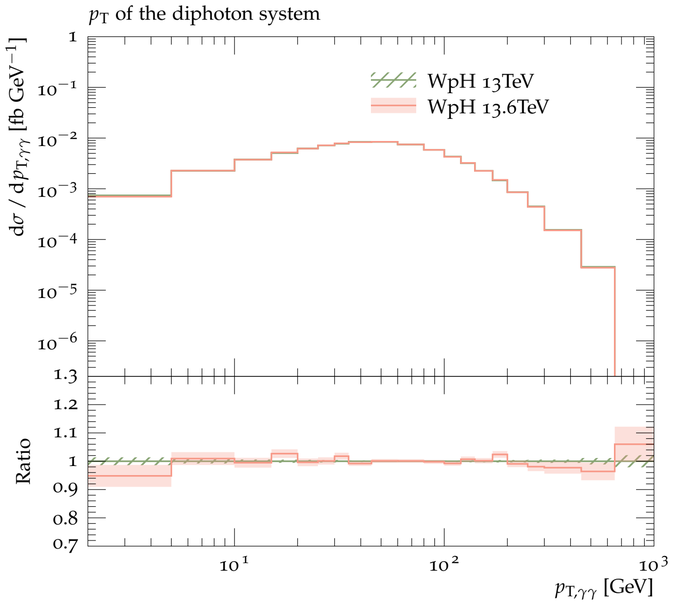
$H\gamma\gamma$ MC validation

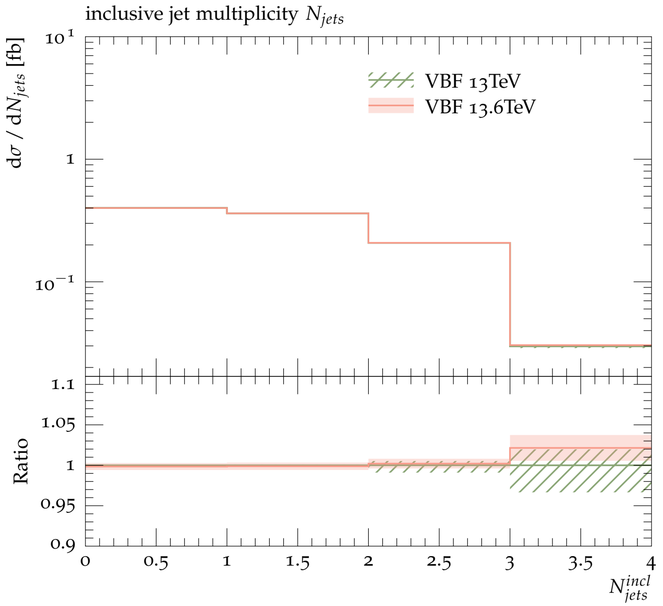
13.6TeV $H\gamma\gamma$ baseline signal sample validation

- validated process: VBF, $W^{\pm}H$, ttH
- JIRA ticket requesting showering the LHE files: https://its.cern.ch/jira/browse/ATLMCPROD-10105
- working on ZH and ggZH $H \rightarrow \gamma\gamma$ process

Difference from Run2 samples

- changed tune from AZNLO to A14 (ttH process already used A14 in Run2)
- disabled Dalitz decay in the jobOptions.

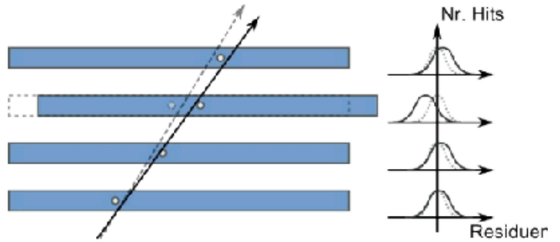


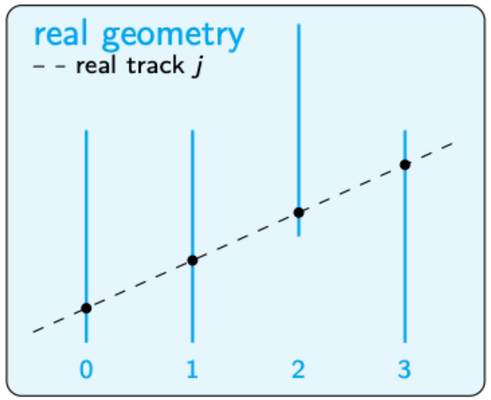


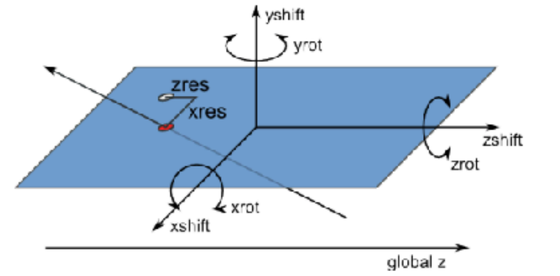
CEPC vertex detector offline software

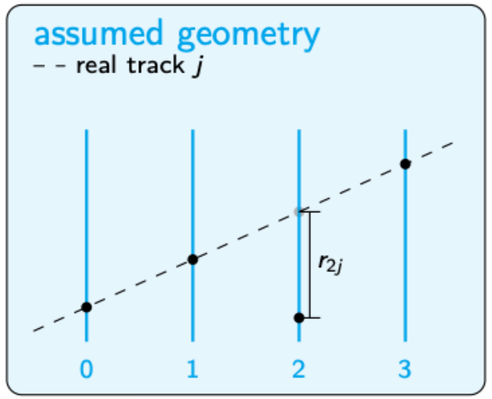
MOST2 TaiChupix3 prototype testbeam

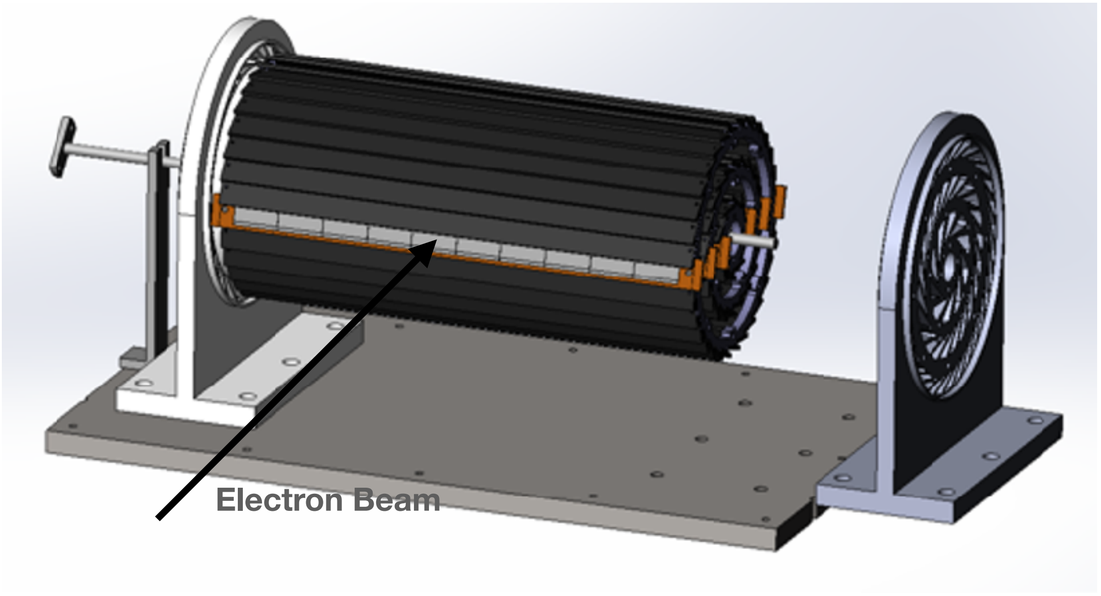
- Plan to perform beam test in Desy at December
- get the spatial resolution of TaiChupix3
- need to build a standalone offline analysis framework
  - track reconstruction (no magnetic field, straight line fit)
  - track alignment (interface to Millepede II)

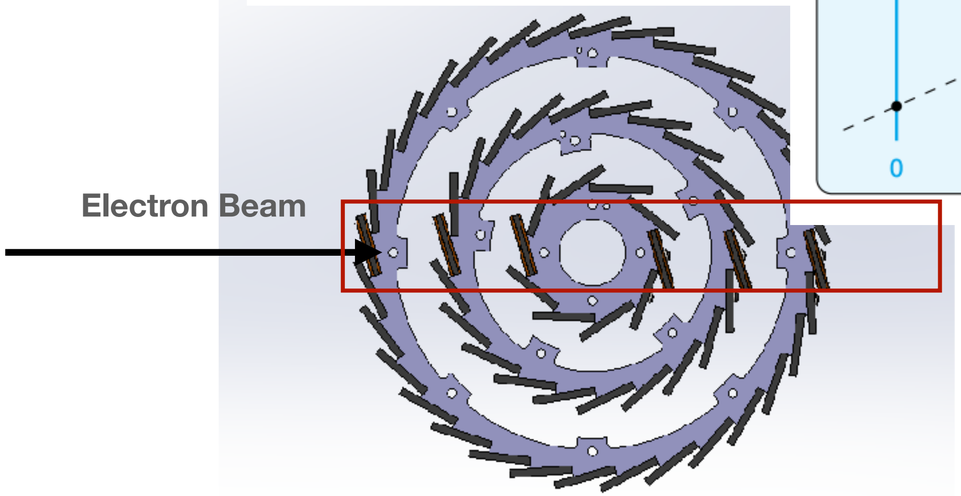








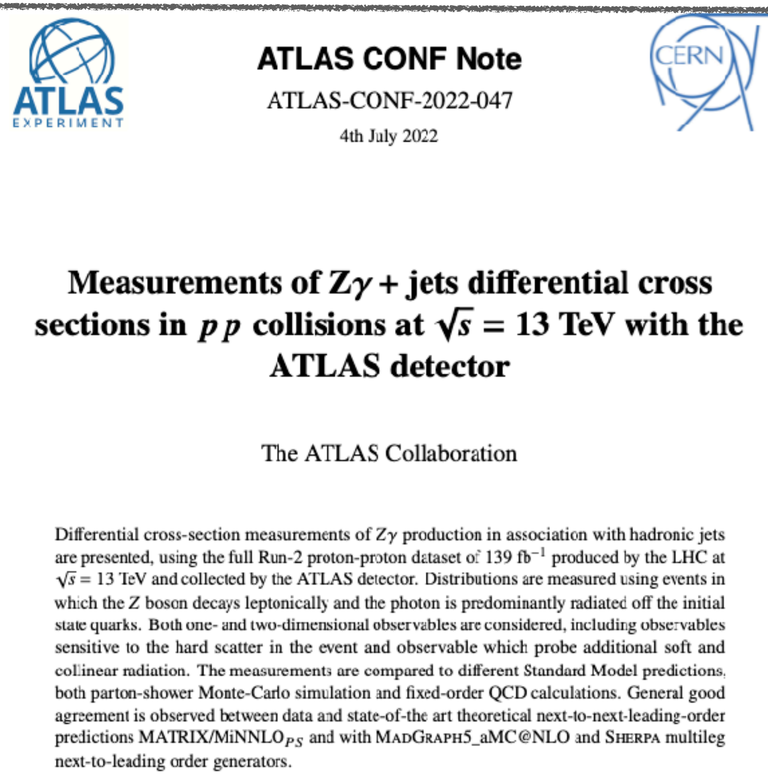




总结与展望

ATLAS实验 Zgamma+jets fiducial微分截面的测量

- 2021年5-8月份在Zγ+jets分析完成的工作：
  - ☑ 在ATLAS Paper approval meeting上给了分析总结报告
  - ☑ 发表一篇会议文章 ICHEP 2020
- 下一步计划：
  - ☐ 第二轮 circulation，准备文章发表
  - ☐ 准备HEPData



ATLAS CONF Note

ATLAS-CONF-2022-047

4th July 2022

Measurements of $Z\gamma$ + jets differential cross sections in pp collisions at $\sqrt{s}$ = 13 TeV with the ATLAS detector

The ATLAS Collaboration

Differential cross-section measurements of $Z\gamma$ production in association with hadronic jets are presented, using the full Run-2 proton-proton dataset of 139 fb^{-1} produced by the LHC at $\sqrt{s}$ = 13 TeV and collected by the ATLAS detector. Distributions are measured using events in which the Z boson decays leptonically and the photon is predominantly radiated off the initial state quarks. Both one- and two-dimensional observables are considered, including observables sensitive to the hard scatter in the event and observable which probe additional soft and collinear radiation. The measurements are compared to different Standard Model predictions, both parton-shower Monte-Carlo simulation and fixed-order QCD calculations. General good agreement is observed between data and state-of-the art theoretical next-to-next-leading-order predictions MATRIX/MiNNLO$_{PS}$ and with MadGraph5_aMC@NLO and Sherpa multileg next-to-leading order generators.

ATLAS实验 $H\gamma\gamma$ MC validation

- 下一步计划：继续完成ggZH，ZH等过程的MC validation

CEPC MOST2 vertex detector offline analysis framework

- 正在准备test beam的模拟数据
- 搭建径迹重建和校准的离线分析软件