2023年1-4月研究生考核报告

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2023. 4. 23

$Z\gamma$+jets analysis

- Introduction
  - Measurement of pp → Z(ll) γ + jets fiducial differential cross section
  - Motivation: test of parton shower prediction, pdf, and fixed order QCD calculation; Z-boson polarization interpretation
  - Method: Unfolding
  - Measured observables: **QCD variables (1D Unfolding)**: m_{jj}, $nJets$, $m_{ll\gamma}$, p_T^{γ}, p_T^{ll} ...
    Polarisation variables (2D Unfolding): $cos\theta_{CS}$ /ϕ_{CS} in 5 bins of p_T^{ll}
- Finished task
  - 2D unfolding and all relative task related to unfolding, systematic uncertainties study, final results
  - support note editor, ATLAS approval meeting reporter
- Status
  - Paper accepted by JHEP in 25.02.2023
  - arxiv: https://arxiv.org/abs/2212.07184

EUROPEAN ORGANISATION FOR NUCLEAR RESEARCH (CERN)

Submitted to: JHEP

CERN-EP-2022-240
15th December 2022

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

The ATLAS Collaboration

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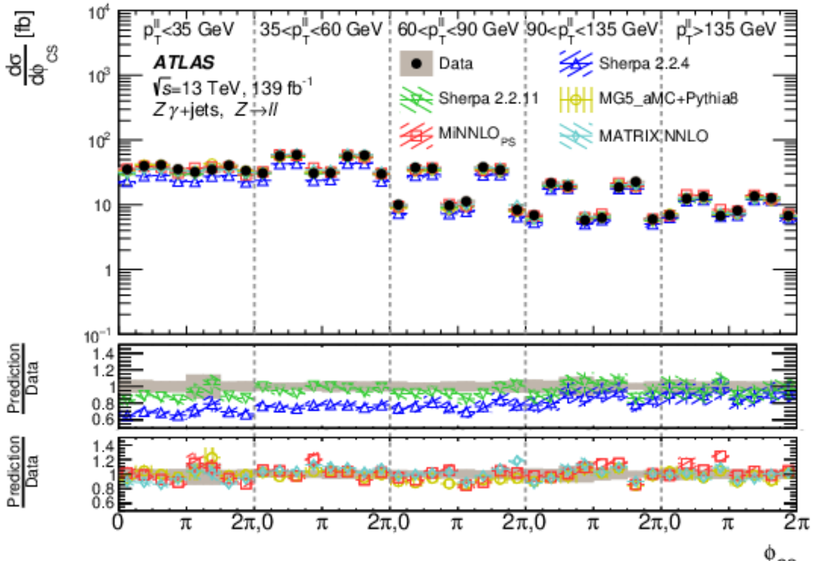
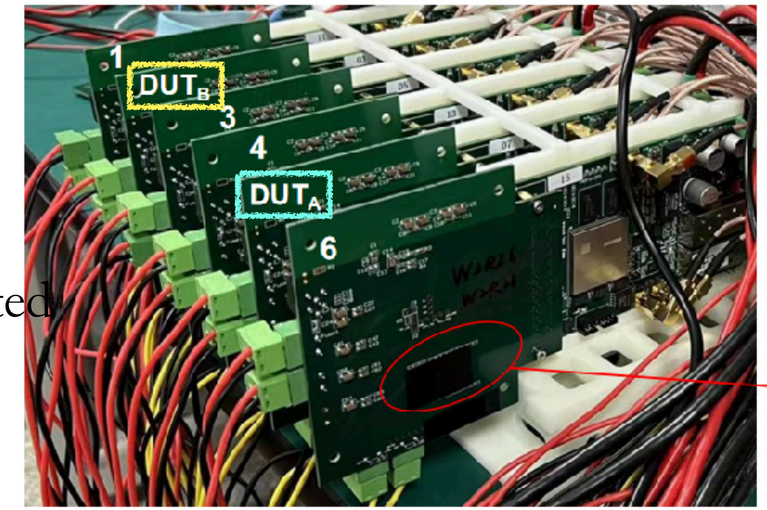


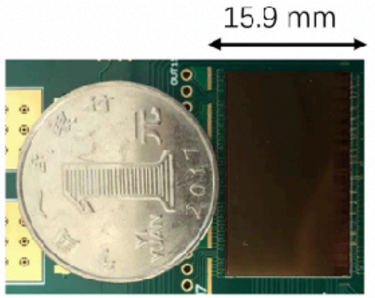
CEPC vertex detector beam test at DESY

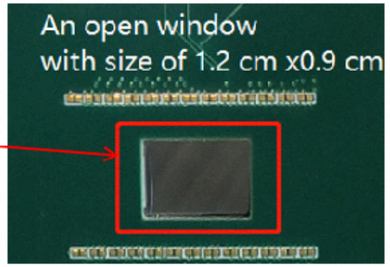
- Introduction
  - TaiChuPix3 sensor designed for CEPC vertex detector
  - Beam test at DESY from 2022.12.12 - 2022.12.22
- Beam test setup
  - 2 detector under test (DUT) with different processes tested

    DUTA : full depletion

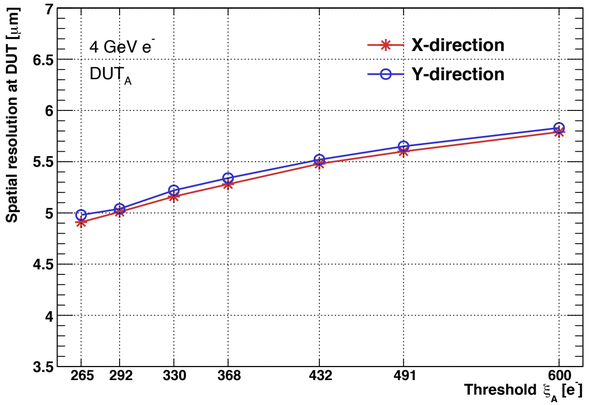
    DUTB : non full depletion

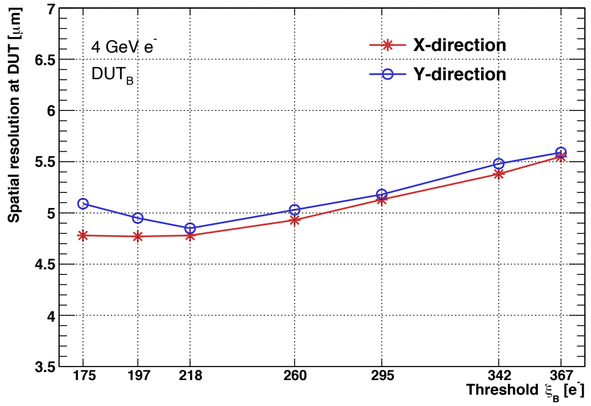


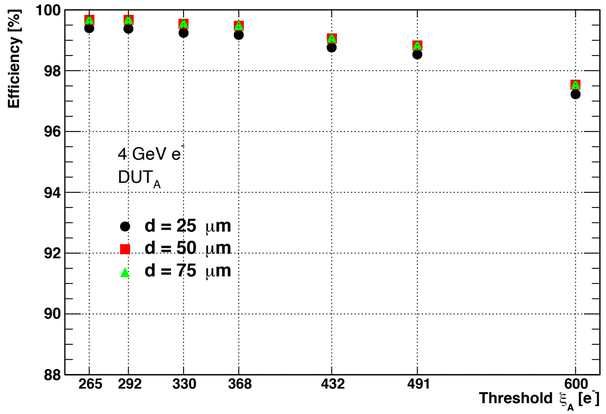


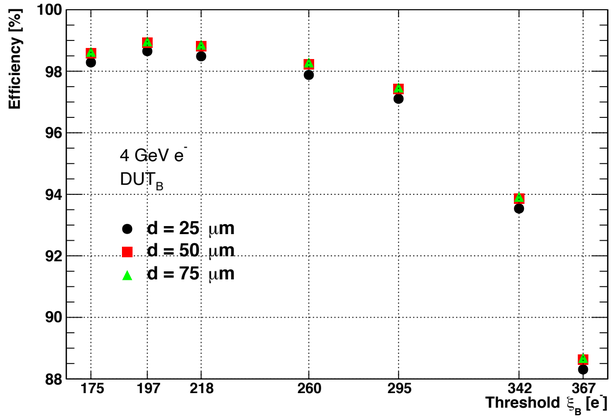


- Offline analysis results









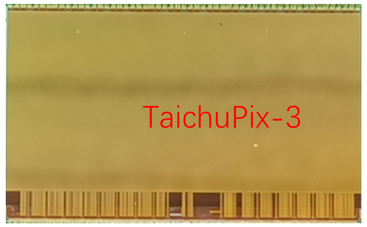
- spatial resolution around 5um
- detection efficiency > 98%

- Paper "Beam test of a 180 nm CMOS Pixel Sensor for the CEPC vertex detector" plan to submit to NIMA
- 11th Beam Telescopes and Test Beams Workshop reporter

• Vertex detector prototype beam test

- Beam test at DESY from 2023.4.11- 2023.4.23

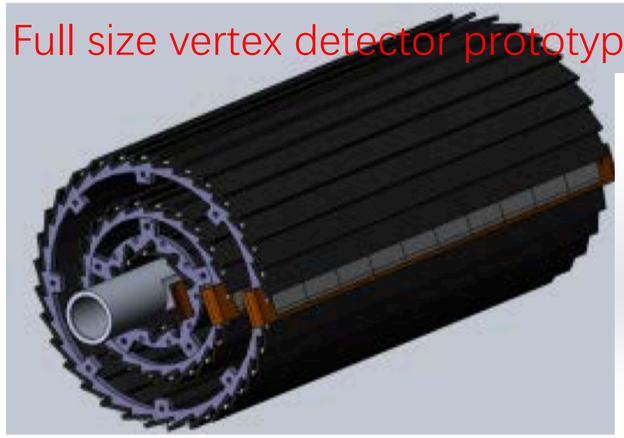
CMOS pixel sensor prototyping



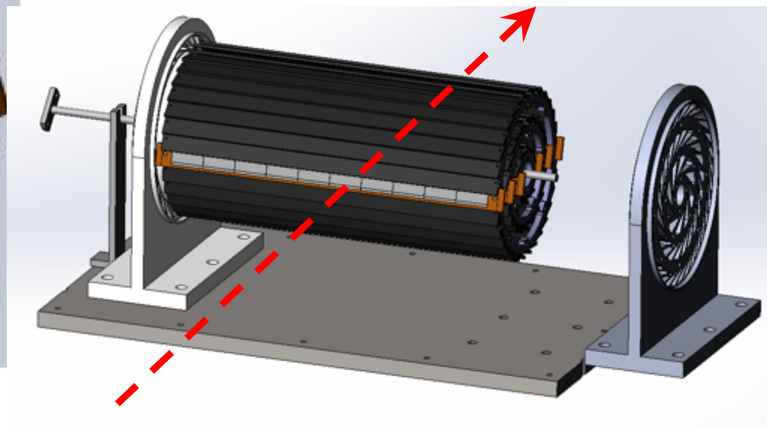
Detector module (ladder) prototyping

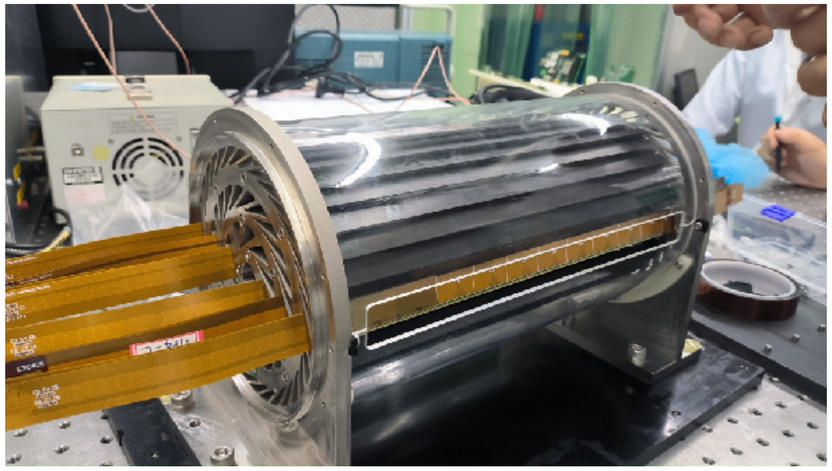
Double sided ladder
10 sensors/ladder side, read out from both ends

Full size vertex detector prototype

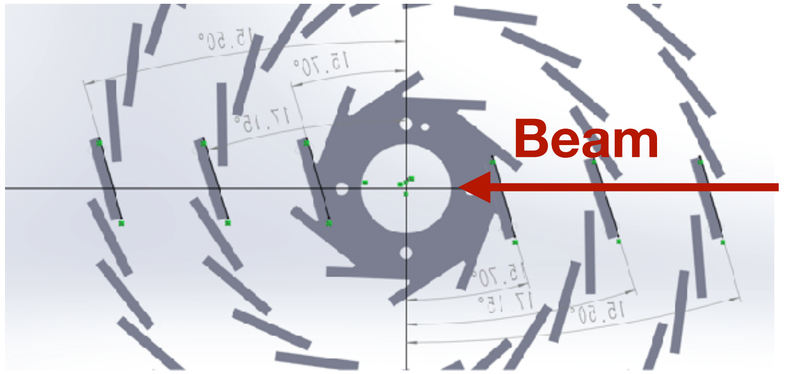


Beam test to verify its spatial resolution



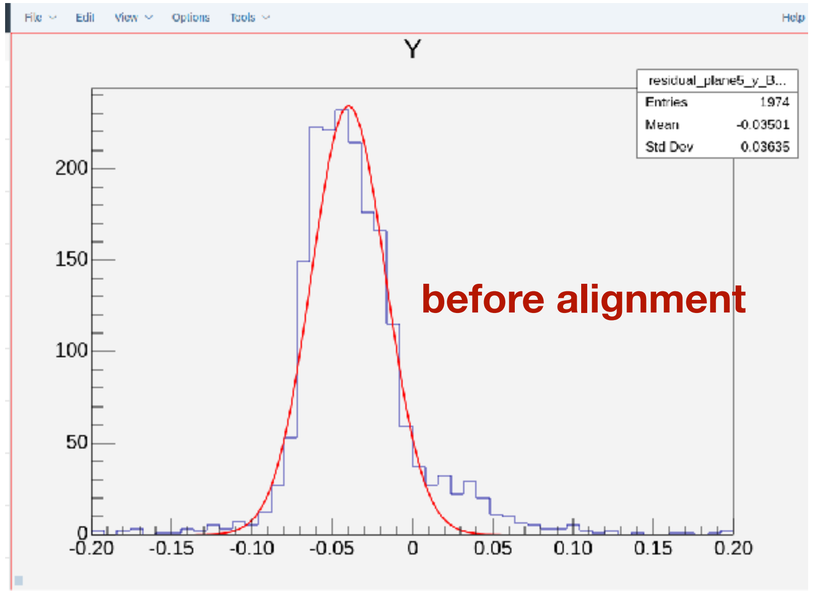


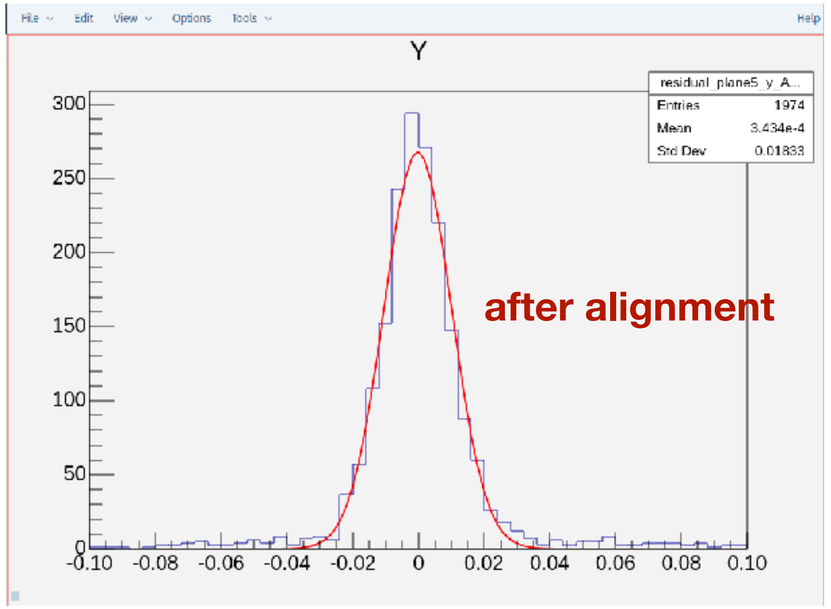
6 ladders with double sided chips



-Preliminary offline analysis results

- Track reconstruction
- alignment can work well for prototype geometory



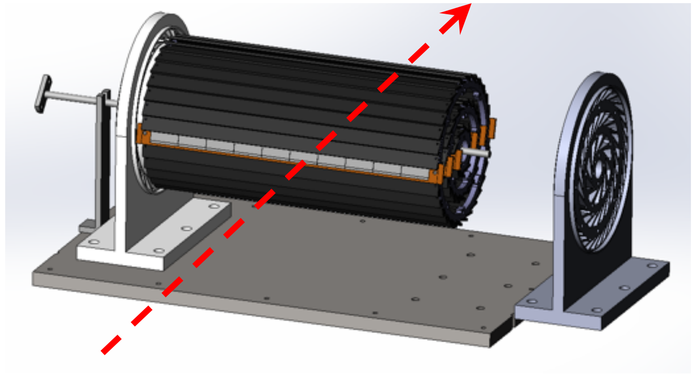


- More data are analysing...

Summary

- ATLAS Zgamma + jets physics analysis
  - 文章已经在2月份被JHEP接收
  - arxiv: https://arxiv.org/abs/2212.07184
- Offline analysis framework for CEPC Vertex detector test beam
  - 为太初硅像素芯片束流测试搭建了径迹重建和校准的离线分析软件
  - 通过离线分析得到空间分辨率小于5 um, 探测效率高于98%
  - 第一次束流测试的文章准备投稿到NIMA，共同一作
  - 第11届 Beam Telescopes and Test Beams Workshop 会议报告
    - 正在分析第二次顶点探测器原型机束流测试的数据
    - 用模式识别来做径迹的重建

Beam test to verify its spatial resolution



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Beam test of a 180 nm CMOS Pixel Sensor for the CEPC vertex detector

Tianya Wu[a,c,1], Shuqi Li[a,b,1], Wei Wang[a,c], Jia Zhou[a,b], Ziyue Yan[a,b], Yiming Hu[e], Xiaoxu Zhang[e], Zhijun Liang[a,c,*], Wei Wei[a,c,*], Ying Zhang[a,c,*], Xiaomin Wei[d], Xinhui Huang[a,b], Lei Zhang[e], Ming Qi[e], Hao Zeng[a,b], Xuewei Jia[a,b], João Guimarães da Costa[a], Jun Hu[a,c], Jinyu Fu[a,c], Hongyu Zhang[a,b,c], Gang Li[a], Linghui Wu[a], Mingyi Dong[a,b,c], Xiaoting Li[a,c], Raimon Casanova[g], Liang Zhang[f], Jianing Dong[f], Jia Wang[d], Ran Zheng[d], Weiguo Lu[a,c], Sebastian Grinstein[g,h]