Weekly Report

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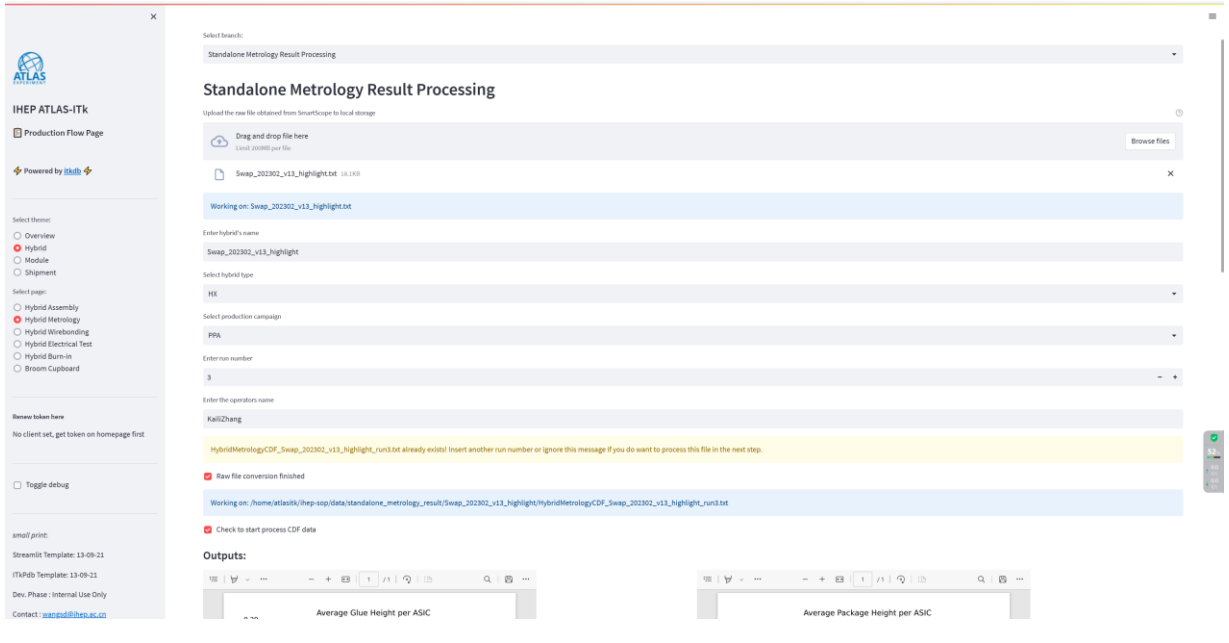
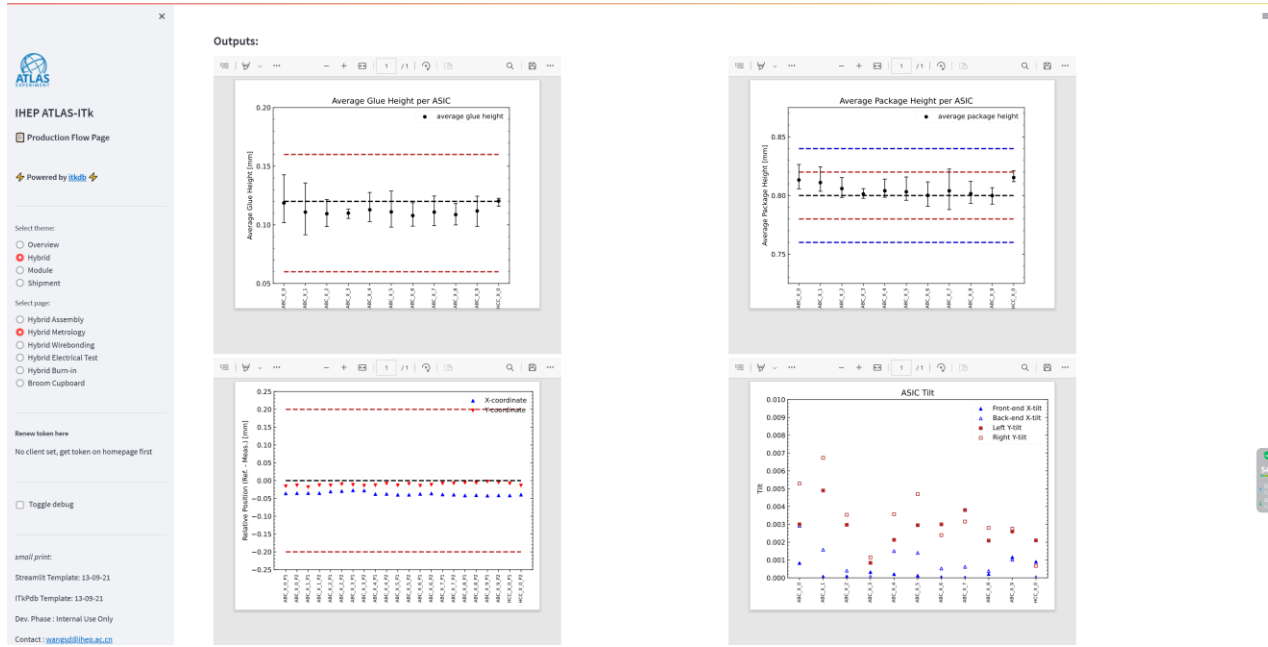
Progresses

- **IHEP ITk Standard Operating Procedure Webpage**
- Change of plan.
  - **In the past:** When building a module/hybrid, each step (each page) is deeply coupled with others (i.e. You need to do one step first, then you could have the access of the next step).
  - **Now:** We (plan to) decouple each step (each page) with each other, modularize them and each step can ne used alone or (with some minor modification) integrated into production flow.
  - Reason: We need a centralized place to hold all functions we needed to reduce the possibility of making mistakes & Have more people to help me to develop this tool
  - Example: standalone metrology result processing subpage.



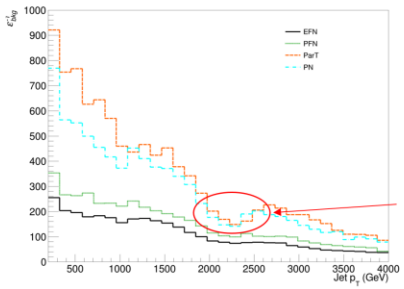


Progresses

- **ATLAS W/Z jet tagging with constituent-based taggers**
- Updated the status of this work at the jet tagging meeting last week.

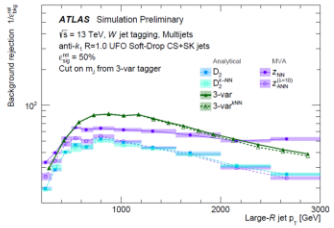
Updates: W jet tagging

- **W jet tagging**
- The background rejection as a function of the jet p_T

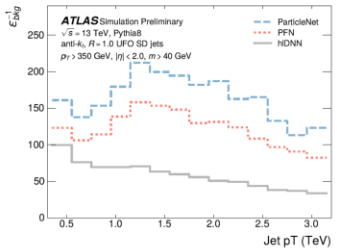


There is a drop around 2.3TeV

Background rejection as a function of the jet p_T, using the threshold which results in a $\epsilon_{sig} = 0.5$ in whole pT range (200 GeV - 4500 GeV).



similar figure in ATL-PHYS-PUB-2021-029



similar figure in const-based top tagger study

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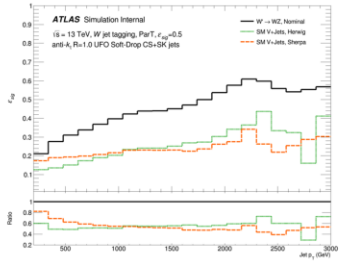
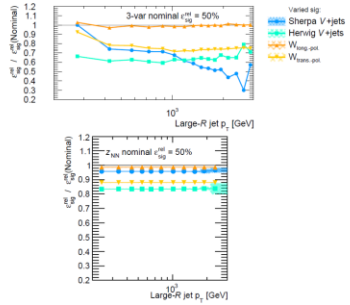
Updates: Model Dependence

- Model dependence check (sensitivity to physics modeling)
  - To estimate the dependence of tagger performance on variations in the parton shower and hadronization models (robustness against differences related to physics modeling).
  - Nominal sample: $W' \to WZ$ with Pythia.
  - Alternative samples: V + jets with Sherpa; V + jets with Herwig.
  - Trained on the nominal sample, evaluated on the two alternative samples. The signal efficiency in each sample is measured using the threshold which results in a signal efficiency of 0.5/0.8 in the nominal sample.
  - Results:

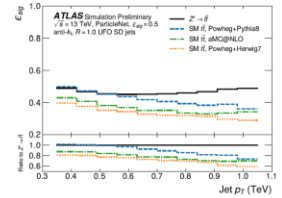
Thanks to Josu for generating these samples!



statistical fluctuation behavior in high jet pT bins



similar tests in ATL-PHYS-PUB-2021-029



similar tests in const-based top tagger study

Cannot be directly compared with results from top tagger study, because the alternative samples are different

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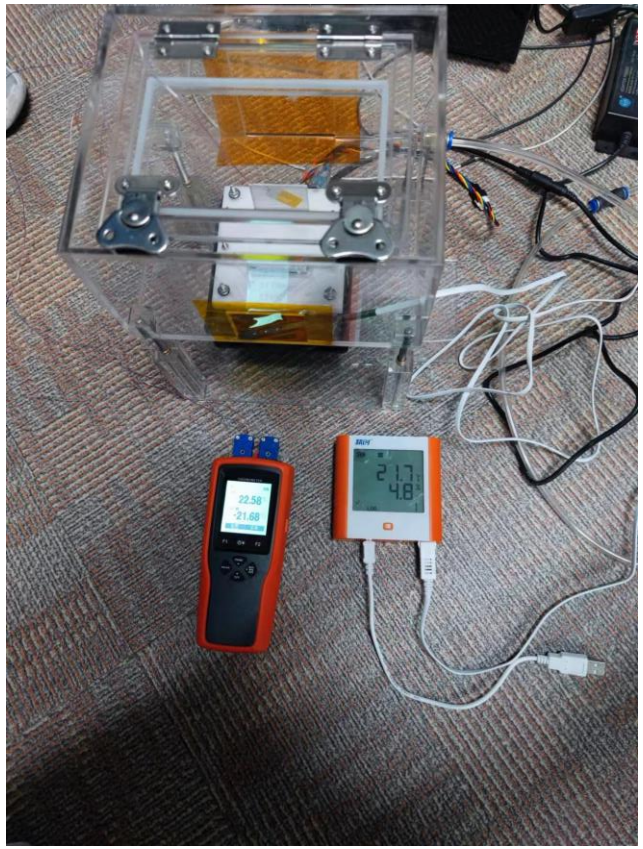
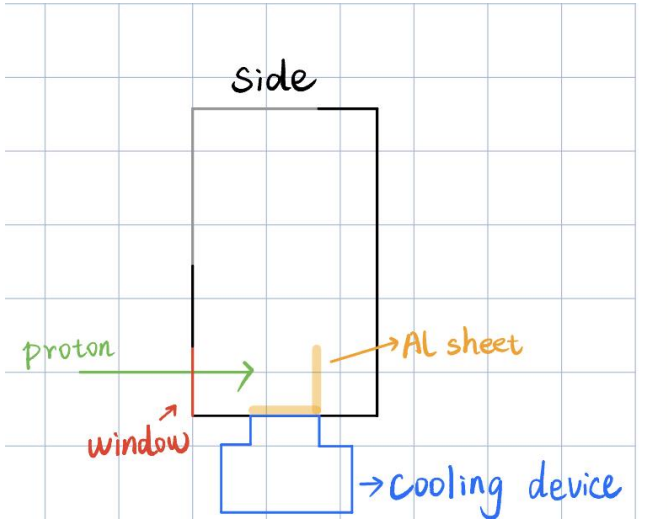
Progresses

- **ITk Sensor ColdBox**
- ColdBox V2



- Successfully reached -20℃ with dry air
- Hard to reach -20℃ with large flow of dry air (only -18℃)
- Have fully exploit the performance of TEC cooler (56℃ of temperature difference)



sideview of the main part of the ColdBox