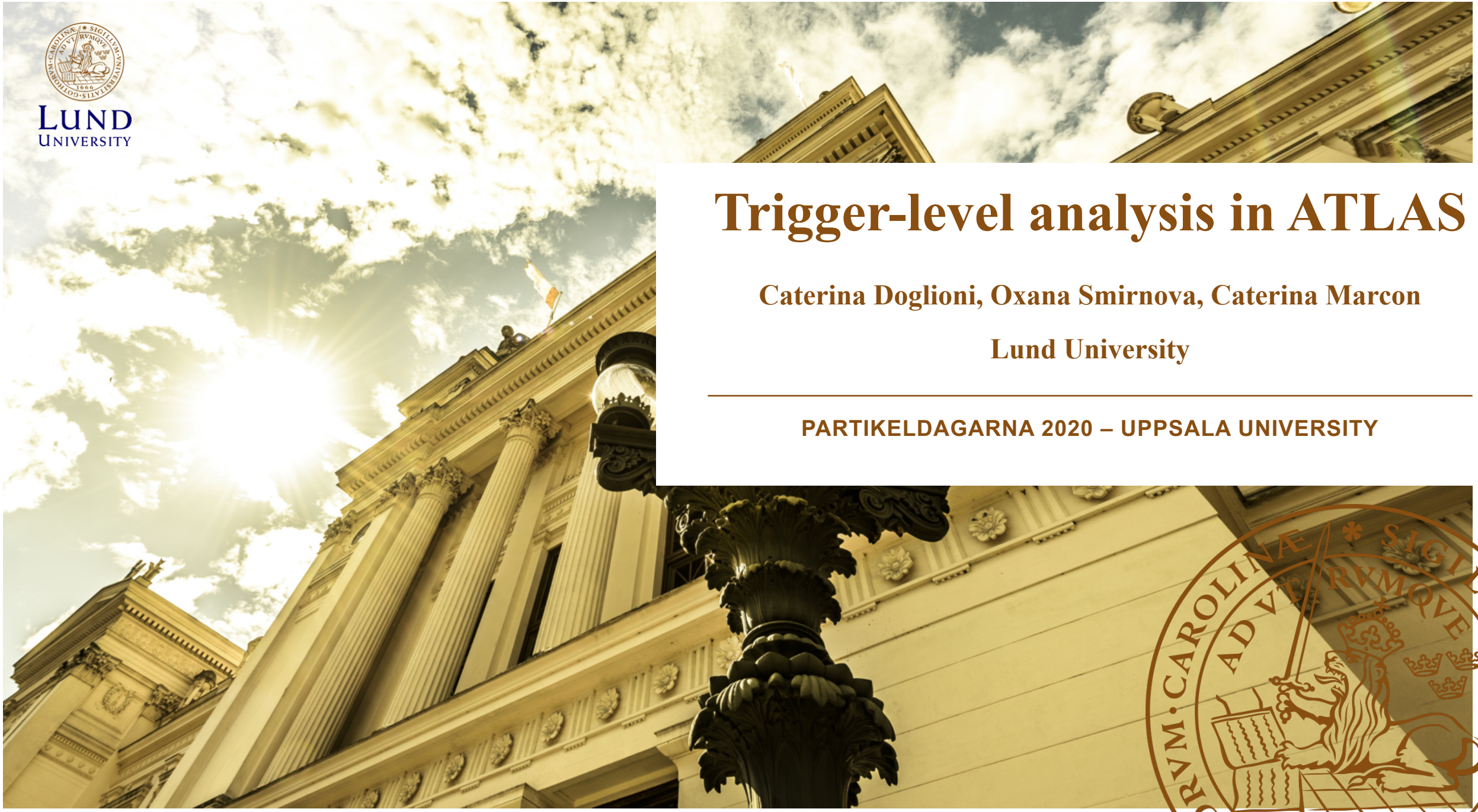

Trigger-level analysis in ATLAS

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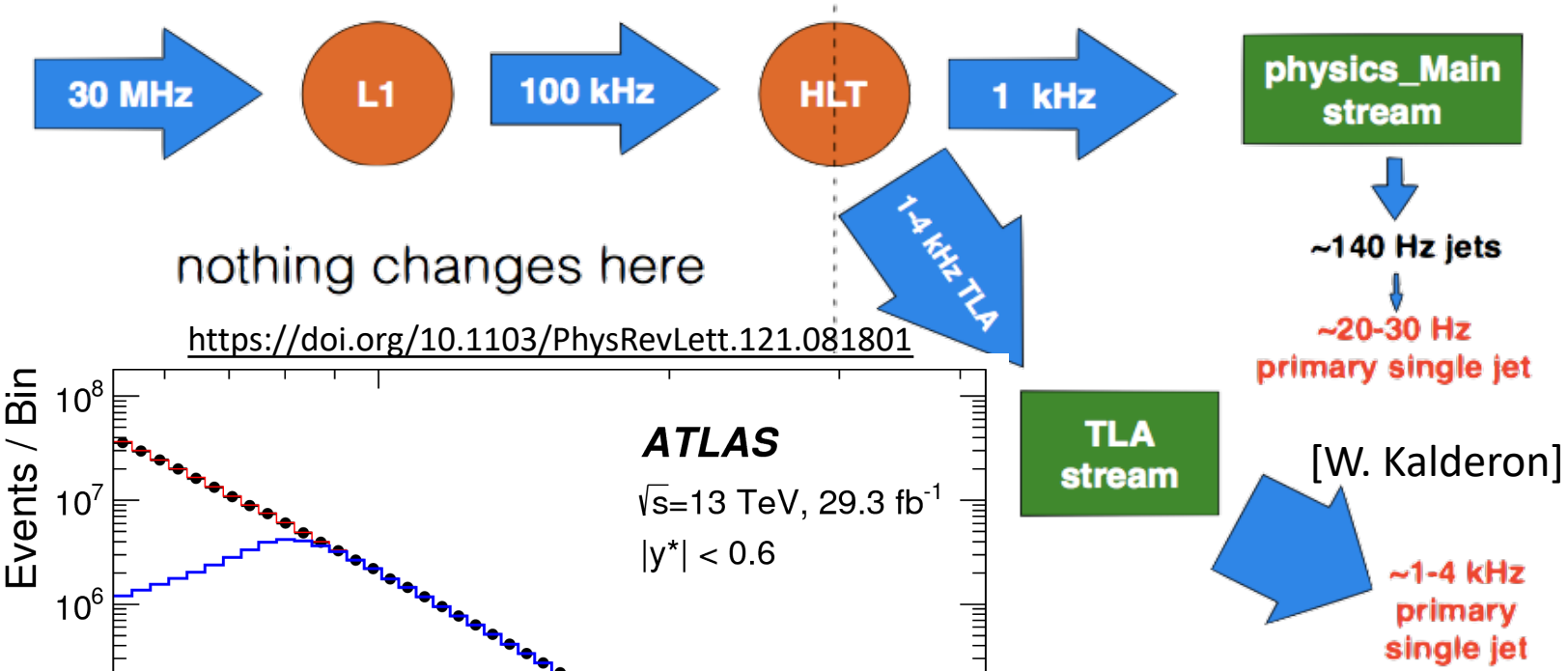
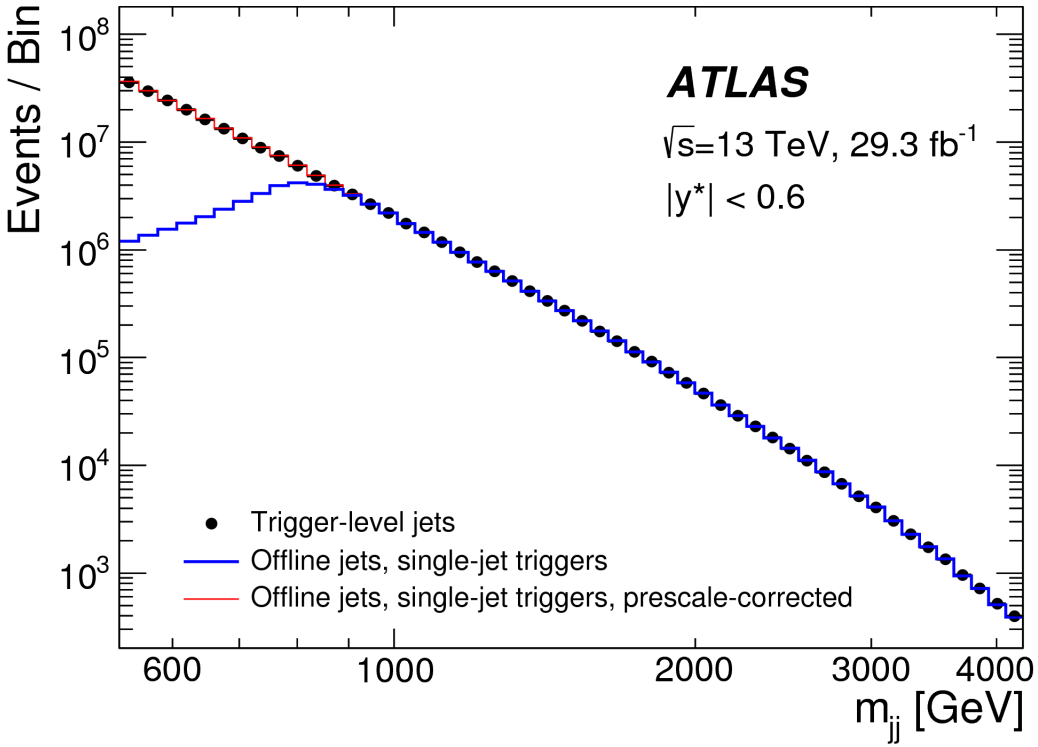
Trigger object Level Analysis





- TLA searches for **low-mass dijet** resonances (450-1800 GeV) using ATLAS detector at LHC.
- Low mass dijet resonance search is difficult due to:
  1. The **high-rate QCD background**.
  2. Main physics events are **highly prescaled** -> they don't provide high enough statistics for dijet resonance search.

Statistical approach for dijet resonance search

- Dijet resonance search requires two main steps:

    1. Measure the **degree of discrepancy** between the **data** collected and the **expected distribution** (SM only).
    2. In absence of any excess, the observed data and the predicted bkg are used to **set limits** on new phenomena.

- These steps depend on a set of **statistical tools** that can be based on different **probability definitions** (i.e. **frequentist** or **Bayesian**).

- **Fit to data** is a crucial step; it affects:

    1. The **degree of discrepancy** between data and SM expected distribution.
    2. The **limit setting procedure** (the error on fit function parameters is one of **the bkg uncertainties**).

Investigation on how different tools perform the fit to data

	ROOT-based	RooFit-based		
	BayesianFramework	**HistFitter**	**xmlAnaWSBuilder**	**quickFit**
Type of input	Data as histograms (uniform bins not required)	Data as histograms (uniformly rebinned automatically)	Data as histograms (uniform binning required)	Data as histograms (uniform binning required)
Fitting functions	Analytical, fit parameters can be initialized (C++)	Hidden from user, PDFs are built by HistFactory	Analytical, fit parameters and range can be provided (XML)	Analytical, fit parameters and range can be provided (XML)
Fit uncertainty	Pseudo-experiments with Poisson fluctuations	Based on user-provided input	Only uncertainty on individual fit parameters is available	Calculated from correlation matrix and available as output

Significant limitations: the user loses control of the details of the analysis

This requires some additional coding compared to other tools