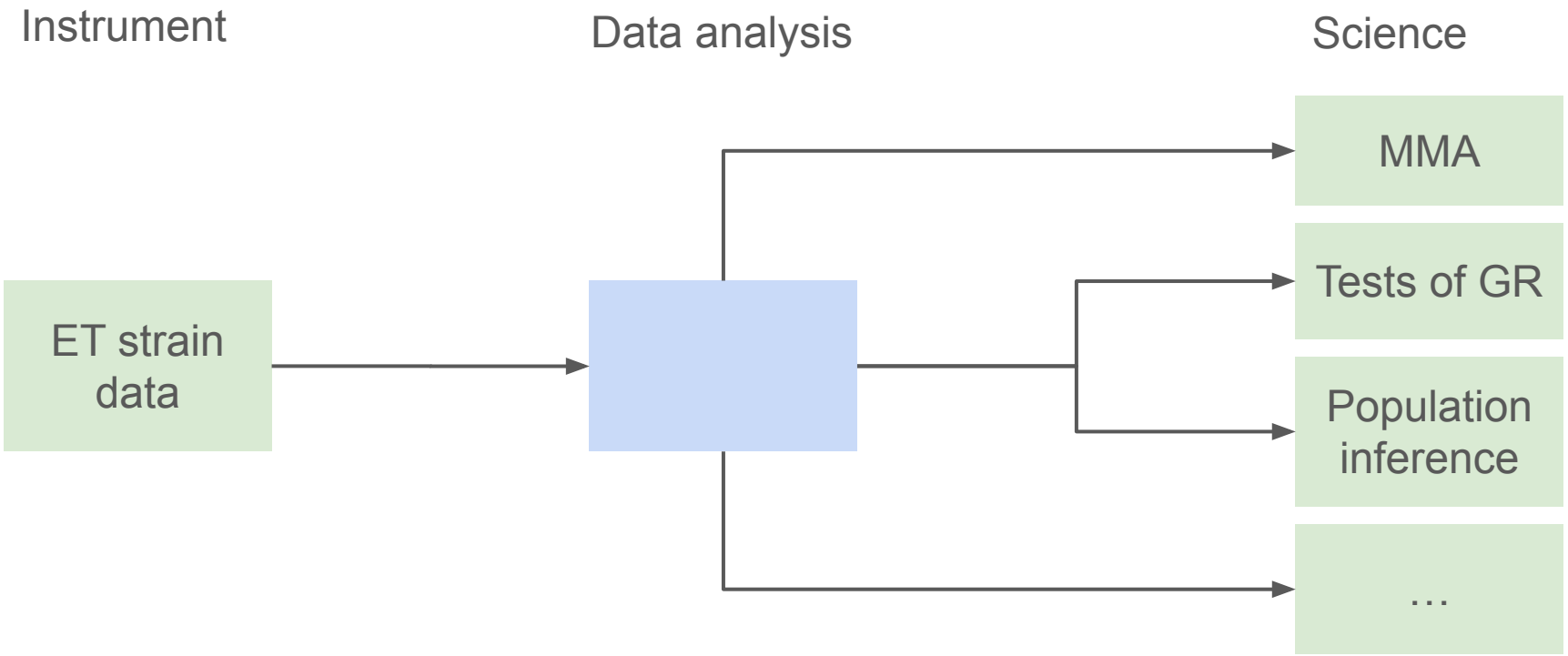
Searches, parameter estimation, and global fit

Tito Dal Canton - ET France workshop, 2026

Overview of the problem



Overview of the problem

Transient signals (e.g. CBCs, CCSN)

- Identify, characterize and separate individual signals/sources
  - Rapid alerts
  - Compile catalogs
- Population-level inference

Persistent signals (e.g. rotating NSs, stochastic CBC foreground)

- Identify, characterize and separate individual signals/sources
  - Rapid alerts?
  - Compile catalogs?
- Population-level inference?

Estimate detector behavior (noise, miscalibration…) and feed back to the ISB

The current approach for LIGO-Virgo-KAGRA

Instrument

Data analysis

Science

ET strain data

Search and characterization

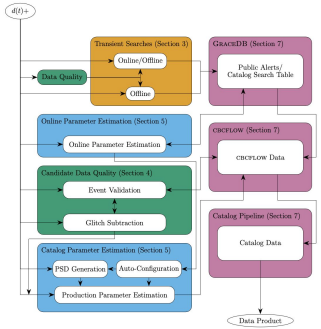
Catalog

MMA

Tests of GR

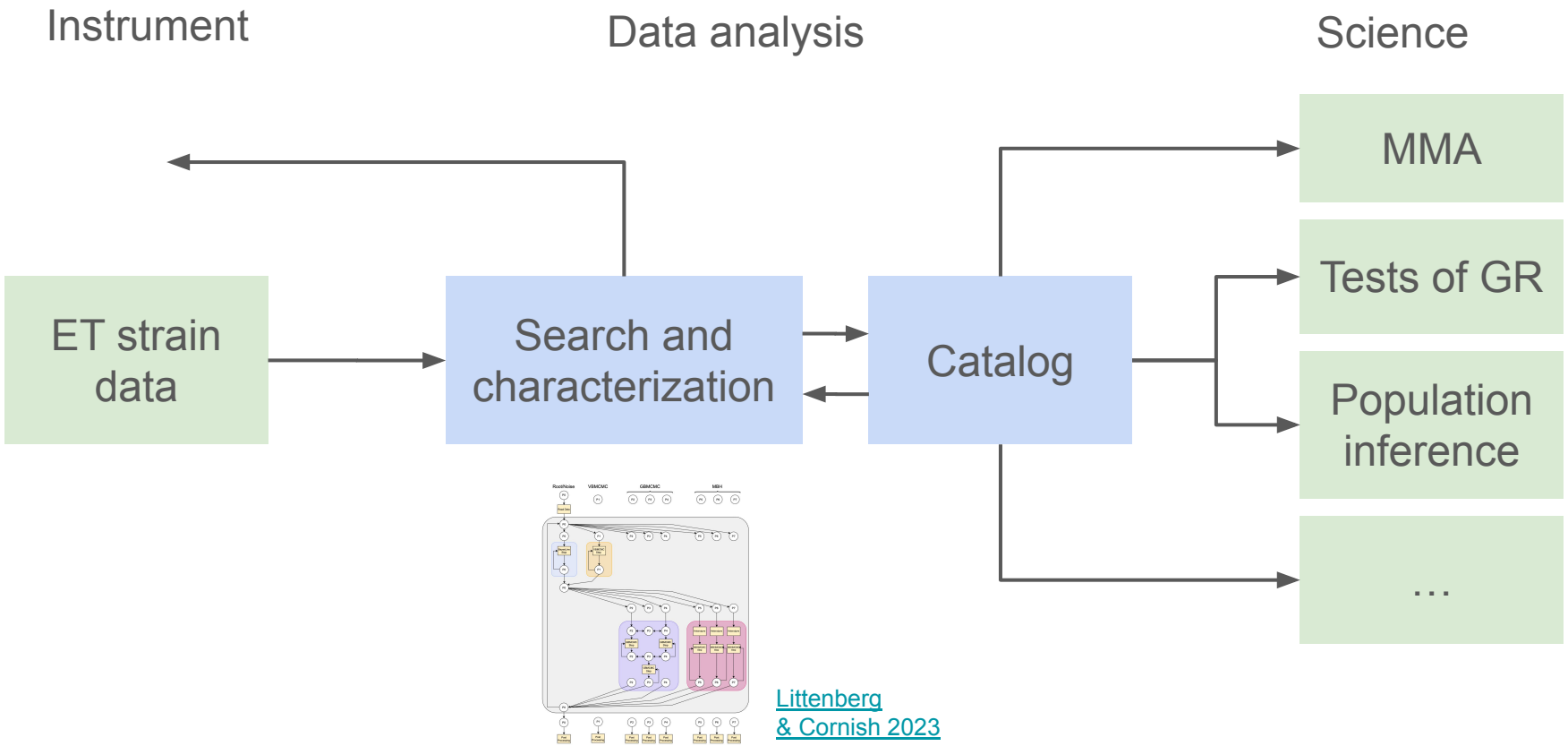
Population inference

…



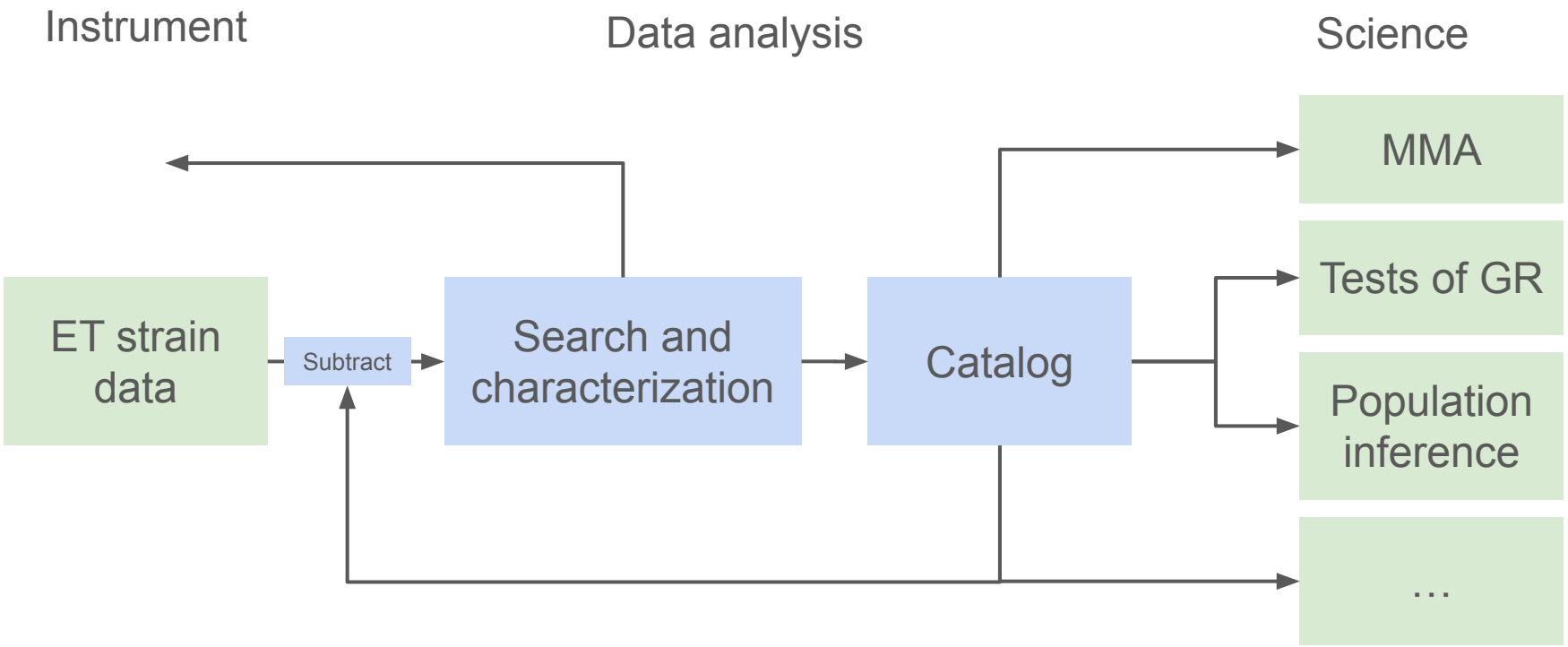
GWTC-4.0 methods paper

Does ET need a “global fit” approach?

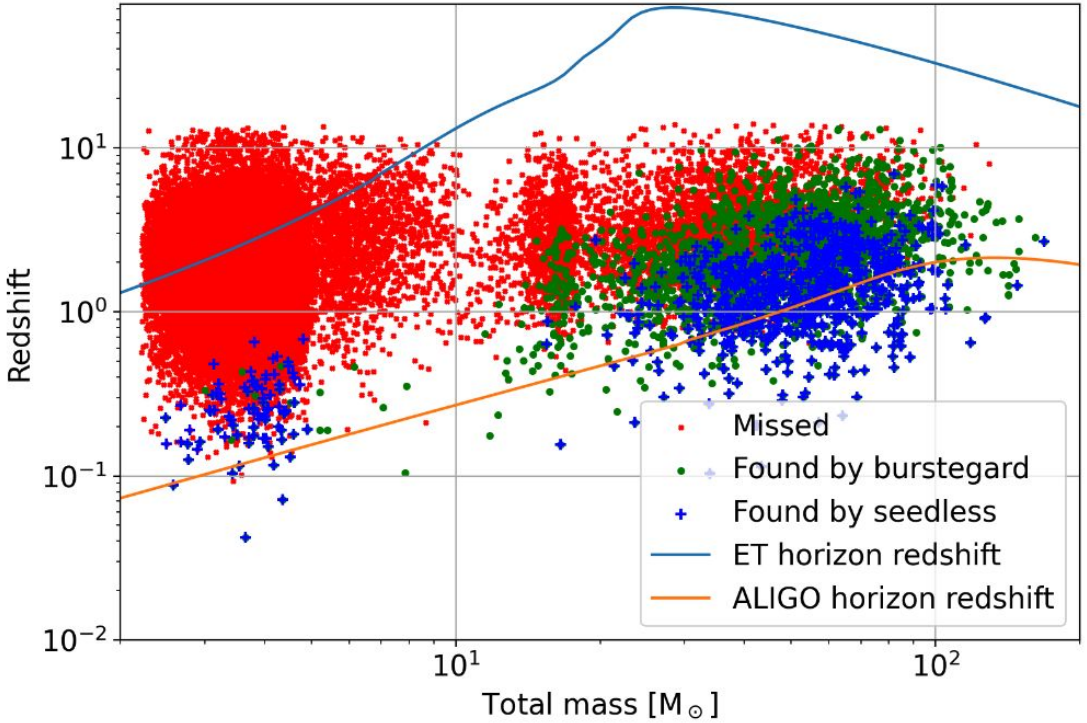


Littenberg & Cornish 2023

A “soft” global fit solution?



Example: weakly modeled transient search for CBCs



Macquet+ 2025

Example: weakly modeled transient search for CBCs

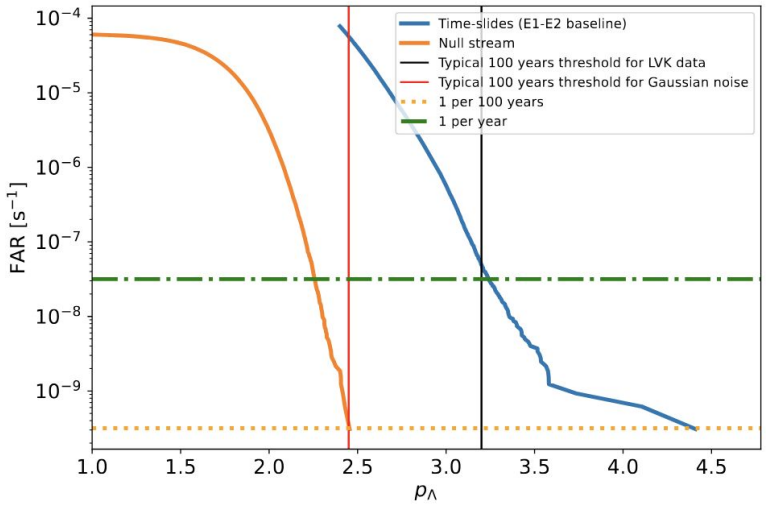


FIG. 1. Cumulative rate of noise triggers as a function of the detection statistic p_Λ for the two methods used to estimate the background.

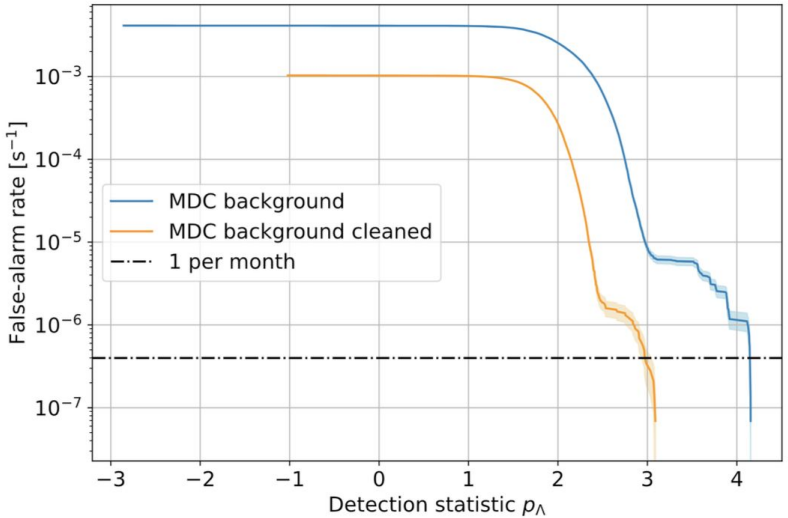


Figure 22 – Comparison of the background estimation for the ET-MDC (in blue) and the cleaned dataset where the loudest GW signals have been subtracted (in blue). The study has been made for 9000 seconds of the ET-MDC from 1001590000 to 1001599000 seconds.

Macquet+ 2025 + V. Glorieux's internship

Example: template bank for an LVK-like CBC search