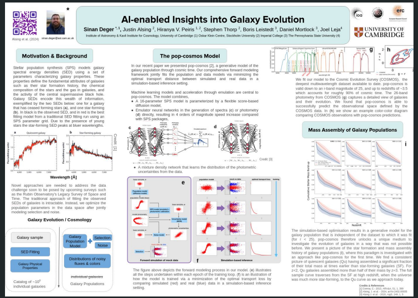
Alsing et al. (2024)
arXiv:2402.00935



Poster Session B - May 1st

European Research Council
Established by the European Commission

AI-enabled Insights into Galaxy Evolution with pop-cosmos

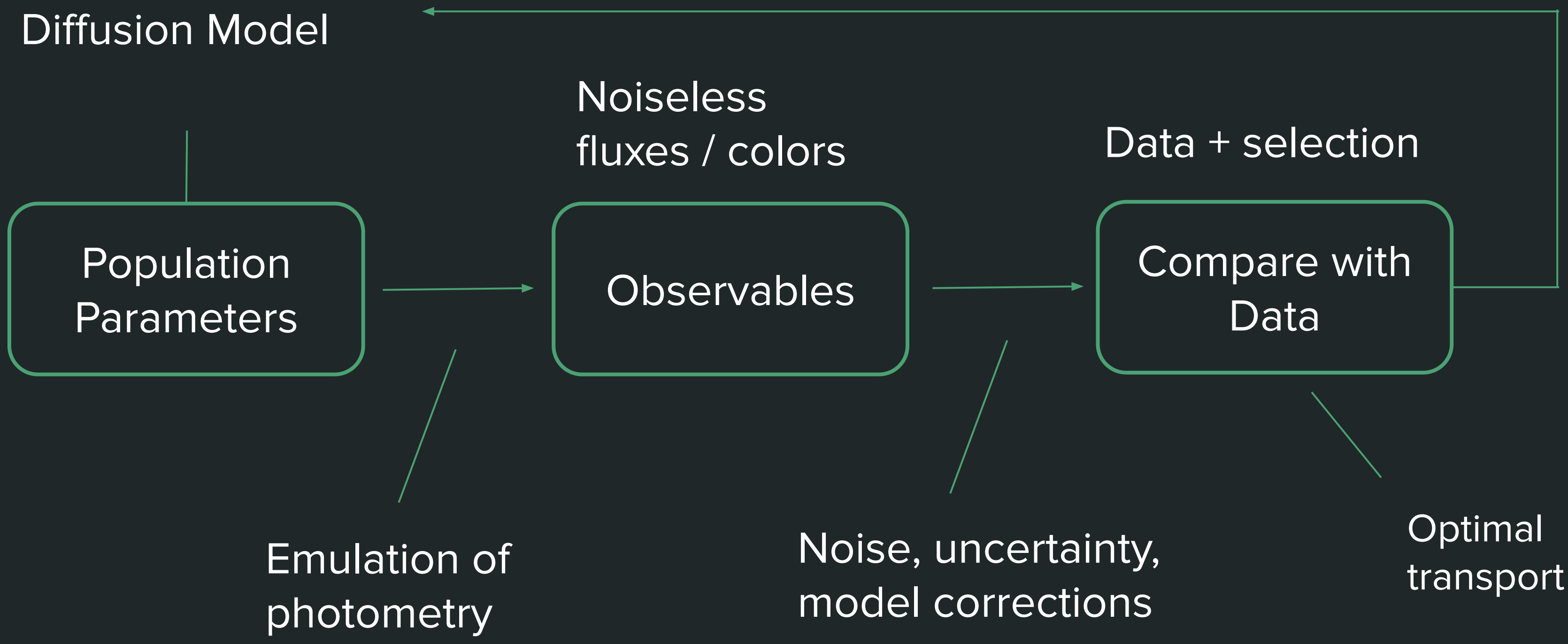
Sinan Deger

Institute of Astronomy & Kavli Institute for Cosmology
University of Cambridge

With Justin Alsing, Hiranya Peiris, Stephen Thorp*, Boris Leistedt, Daniel Mortlock, and Joel Leja

*At EuCAIFCon24

The pop-cosmos Framework - An Overview

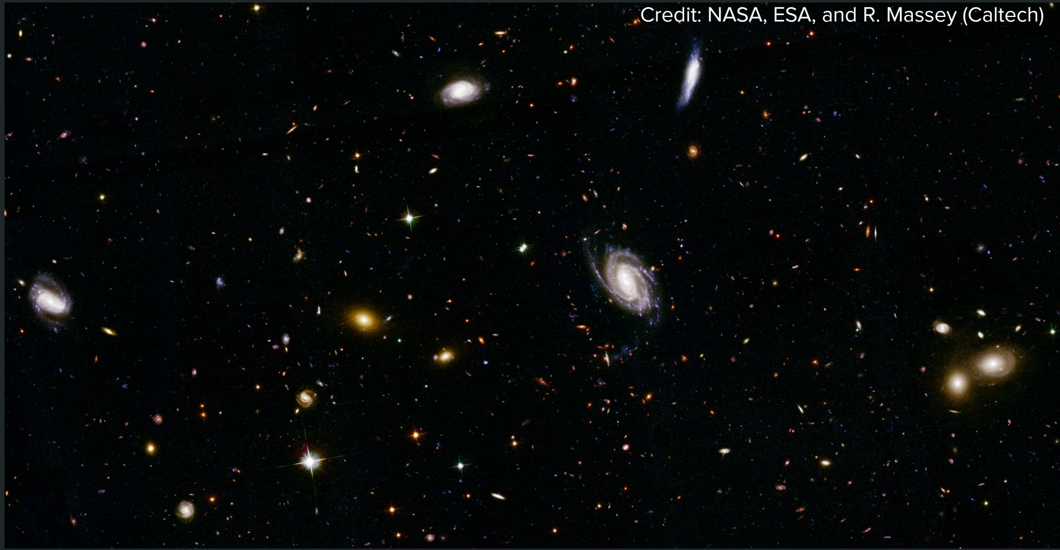


We directly optimize population parameters on the data space by minimizing the optimal transport loss

Training loop for pop-cosmos

Fitting pop-cosmos to Observations

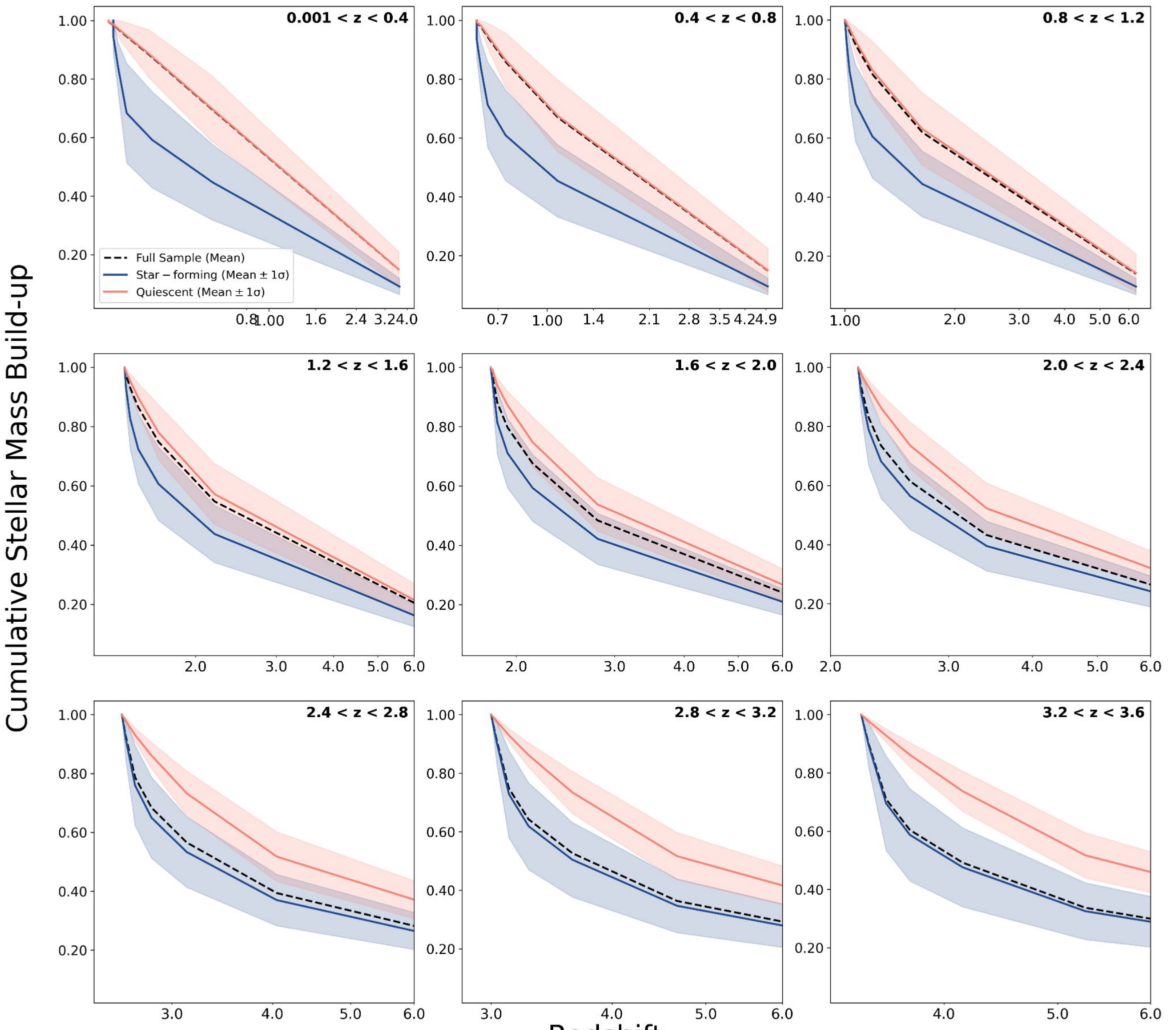
We fit pop-cosmos to COSMOS20 (Weaver+22), a deep galaxy survey with observations from the ultraviolet to the infrared.



Trained pop-cosmos + Survey Noise & Selection → Demographics of any spectroscopic/photometric survey to $r < 25$

The simulation-based optimization approach in pop-cosmos results in a generative model representative of general galaxy populations

Our AI-enabled model unlocks a unique way to investigate the evolution of galaxy populations across 90% of cosmic time (z < 4).



Deger et al. (in prep.)

Convolutional neural network search for long-duration transient gravitational waves from glitching pulsars

Universitat de les Illes Balears | IAC3 Institute of Applied Computing & Community Code.

POSTER 109

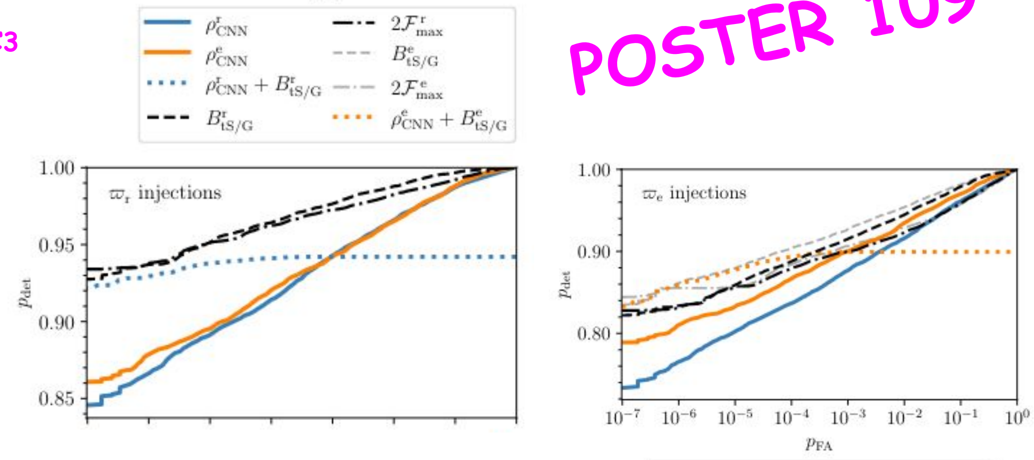
Rodrigo Tenorio – University of the Balearic Islands & IAC3

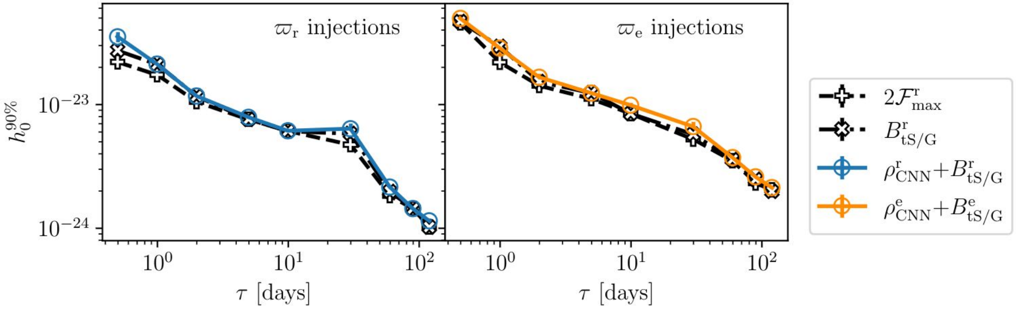
We present a machine-learning search for transient continuous gravitational waves (CWs) sourced by a glitch in the Vela pulsar during the Advanced LIGO O2 observing run.

The resulting pipeline is about 80 times faster than state-of-the-art pipelines at less than a 10% loss in sensitivity.

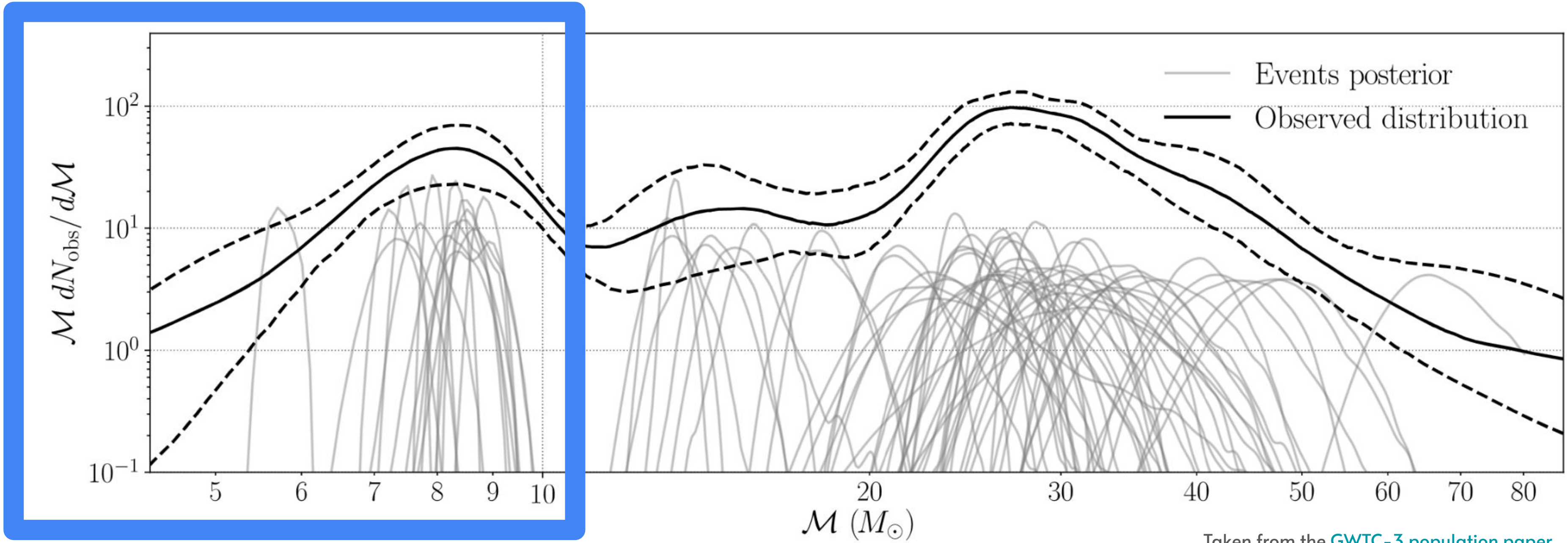
Transient CWs are decaying CWs produced by transient deformations in neutron stars such as decaying mountains or r-modes.

Physical amplitude-evolution models are computationally prohibitive due to the unknown duration and start time of the signal.

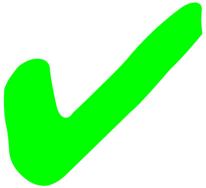


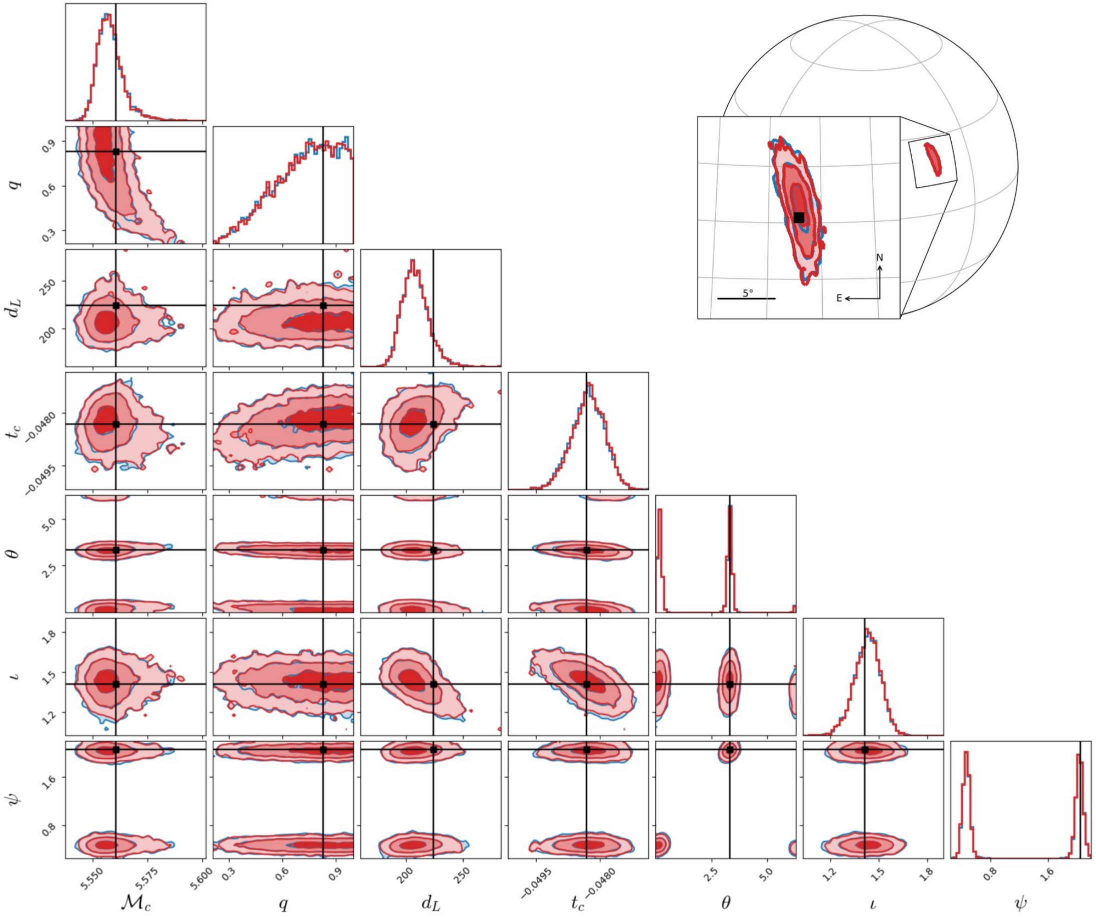


Do we train our SBI models optimally?



Taken from the GWTC-3 population paper





Tuning Neural Posterior Estimation for Gravitational Wave Inference

- Efficient training
- Low hardware requirements
- Yet, **quick inference!**

POSTER LOCATION: **113**