

# Estimating ZTF survey efficiency

Fake injection into ZTF images

# Importance of survey efficiency

## **Problem:**

We need to fully understand survey efficiency for precise and unbiased measurements of transient rates and cosmological parameters

## **Solution:**

1. Insert fake sources into images
2. Rerun discovery pipeline
3. Track discovery of fake event

# Fake injection for PTF

Frohmaier, Sullivan, Nugent et al. (2017)

[arXiv:1704.02951]

- ❖ Pick single PTF field with distribution of observing conditions and image metadata that represents whole survey.
- ❖ Clone-stamp (9x9 pixel box) real point sources covering whole magnitude range
- ❖ Place near galaxies (identified by SExtractor CLASS\_STAR score)
- ❖ Rerun real-time detection pipeline including RB
- ❖ Construct discovery efficiencies as function of image quality etc.
- ❖ Can combine efficiencies with lightcurve templates to assess e.g. SNe Ia

## How can we do this for ZTF?

### **Proposal:** Run similar scheme at IPAC

- ❖ Set up separate stream with separate DB
- ❖ Add step where fakes are added and tracked
- ❖ Run during daytime or bad weather
- ❖ Need not be run on all fields but as many as possible
  - Need to select representative fields, for which fakes are created throughout the whole survey
- ❖ Need not be necessarily run the same-night
  - Can be run on archival data but should be started as early as possible

# Practical implementation

Partnership provides code for injection, to be implemented at IPAC.

- ❖ What manpower at IPAC is required for this?
  - When could someone be available?
  
- ❖ Who in the partnership can contribute to code development?
- ❖ What code can be reused?
  - I have Chris Frohmaier's code (may become public soon)
  - What about image simulation code used to make test images?