

# Cosmology with SNe Ia and Gravitational Lensing

Ulrich Feindt

ZTF Team meeting  
March 21st, 2018

# Members

## OKC/Stockholm University:

- Rahul Biswas
- Mattia Bulla
- Suhail Dhawan
- Uli Feindt (coordinator)
- Ariel Goobar
- Laura Hangard
- Seméli Papadogiannakis

## IN2P3:

- Mickael Rigault

## HU Berlin/DESY:

- Valéry Brinnel
- Matteo Giomi
- Marek Kowalski
- Jakob Nordin (deputy coordinator)

## Berkeley:

- Danny Goldstein
- Peter Nugent

# Overview

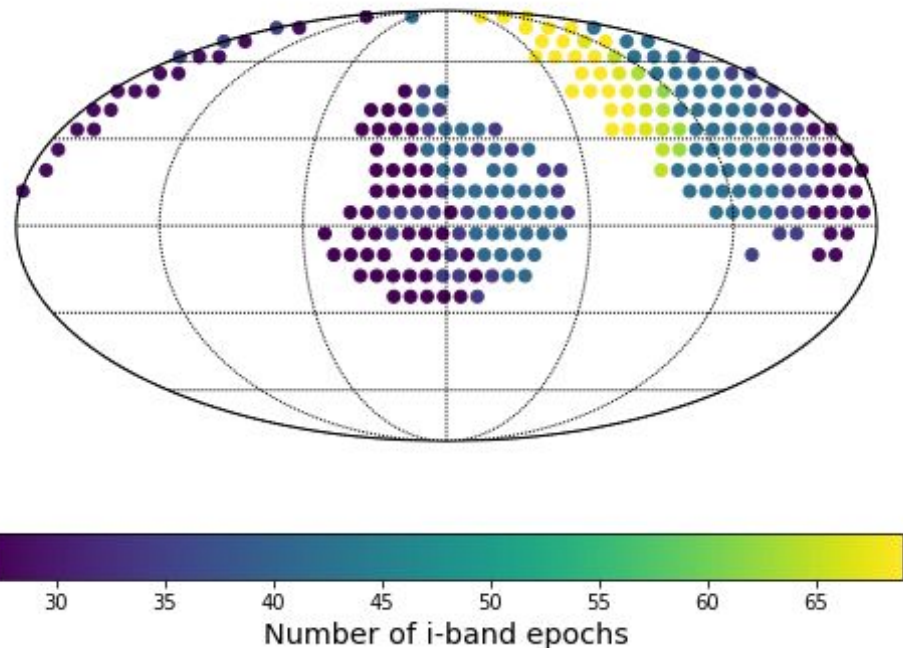
- ZTF is a perfect survey for low-redshift SN Ia cosmology
- **Goal:** Build data set of multi-color lightcurves to anchor Hubble diagram
  - Require additional i-band data (from partnership time)
  - Need to control selection effects
  - Can obtain ~2000 SNe Ia over the course of 3 years
  - Sample size large enough to measure local structure
- Also expect to find more strongly lensed supernovae and could measure  $H_0$

# Selecting i-band survey fields

i-band survey: 6700 sq. deg. at  
4-day cadence

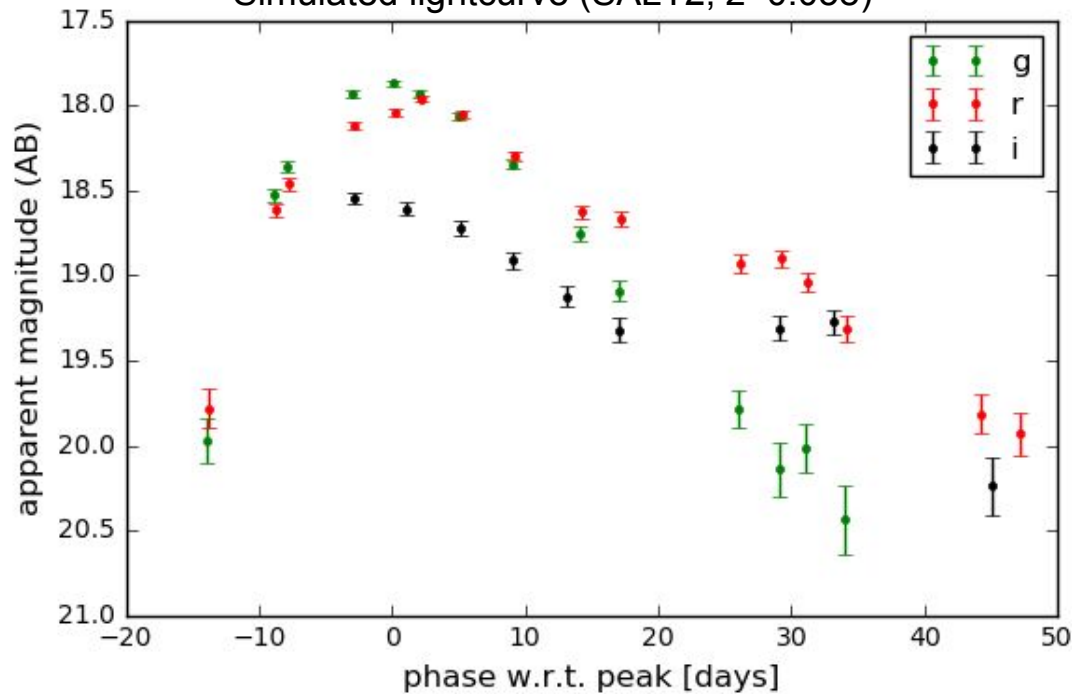
Fields were selected to assure long  
observability (see also Ariel's talk):

- Assumed 9 months (March - November)
- Always include high-cadence field if possible
- MW  $E(B-V) \leq 0.1$
- Observable for at least 3.5 months but preferably longer



# Ideal lightcurve

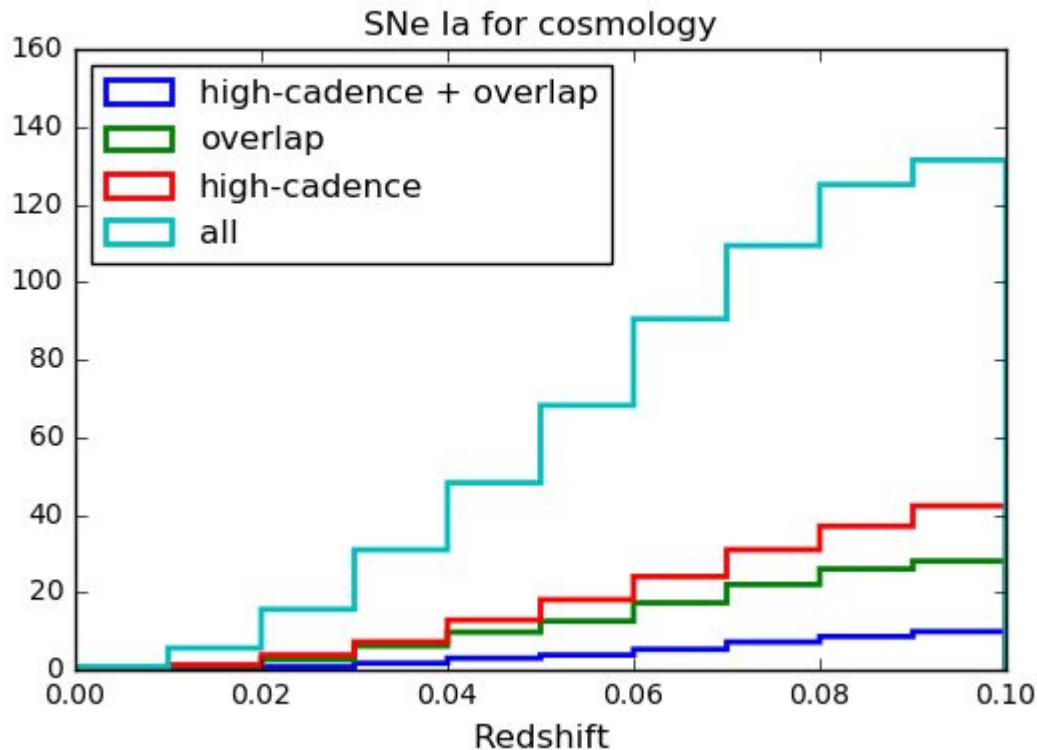
Simulated lightcurve (SALT2,  $z=0.058$ )



SNe Ia for cosmology:

- Early discovery ( $p < -10$ )
- Observed until a month after peak
- At least three i-band points around peak

# Expected supernova discoveries



Expect to find ~625 per year

Some will be in high-cadence fields (or in field overlap)

Peak magnitudes:

- 50% < 18.5
- 86% < 19
- 99% < 19.5



Selection of targets will be managed by AMPEL (see Jakob's talk):

- T2: Get host galaxy redshift and fit lightcurve
- T3: Make ranked list of candidates without type, likely to be SN Ia, soon to reach peak, photo- $z < 0.1$ , mag  $< \sim 19.5$  and send it to marshal etc.

Spectroscopic resources:

- SEDmachine (for the bright 50%, i.e. mag  $< \sim 18.5$ )
- NOT
- ePESSTO
- SNIFS (MoU in prep.)

Planning to keep the selection process fixed and automated to avoid biases.

# Would you like to know more?

Twiki page:

[http://noir.caltech.edu/twiki\\_ptf/bin/view/ZTF/CosmologyWorkingGroup](http://noir.caltech.edu/twiki_ptf/bin/view/ZTF/CosmologyWorkingGroup)

Mailing list:

[ztfia@lists.astro.caltech.edu](mailto:ztfia@lists.astro.caltech.edu) [sign up here](#)

Slack organization:

ztfia.slack.com

Telecon:

Every other Thursday 16:30 CET