



The Time-Domain Extragalactic Survey (TiDES)

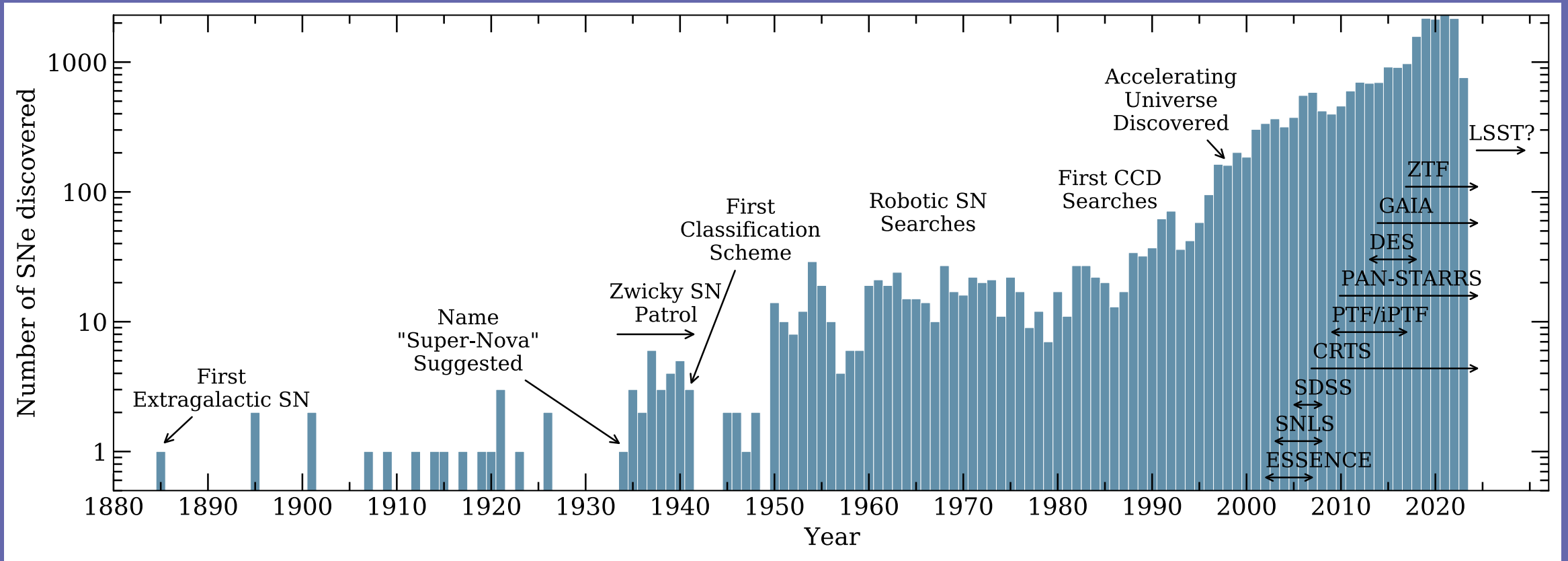
Chris Frohmaier

LSST:UK Senior Research Fellow @ University of Southampton

c.frohmaier@soton.ac.uk

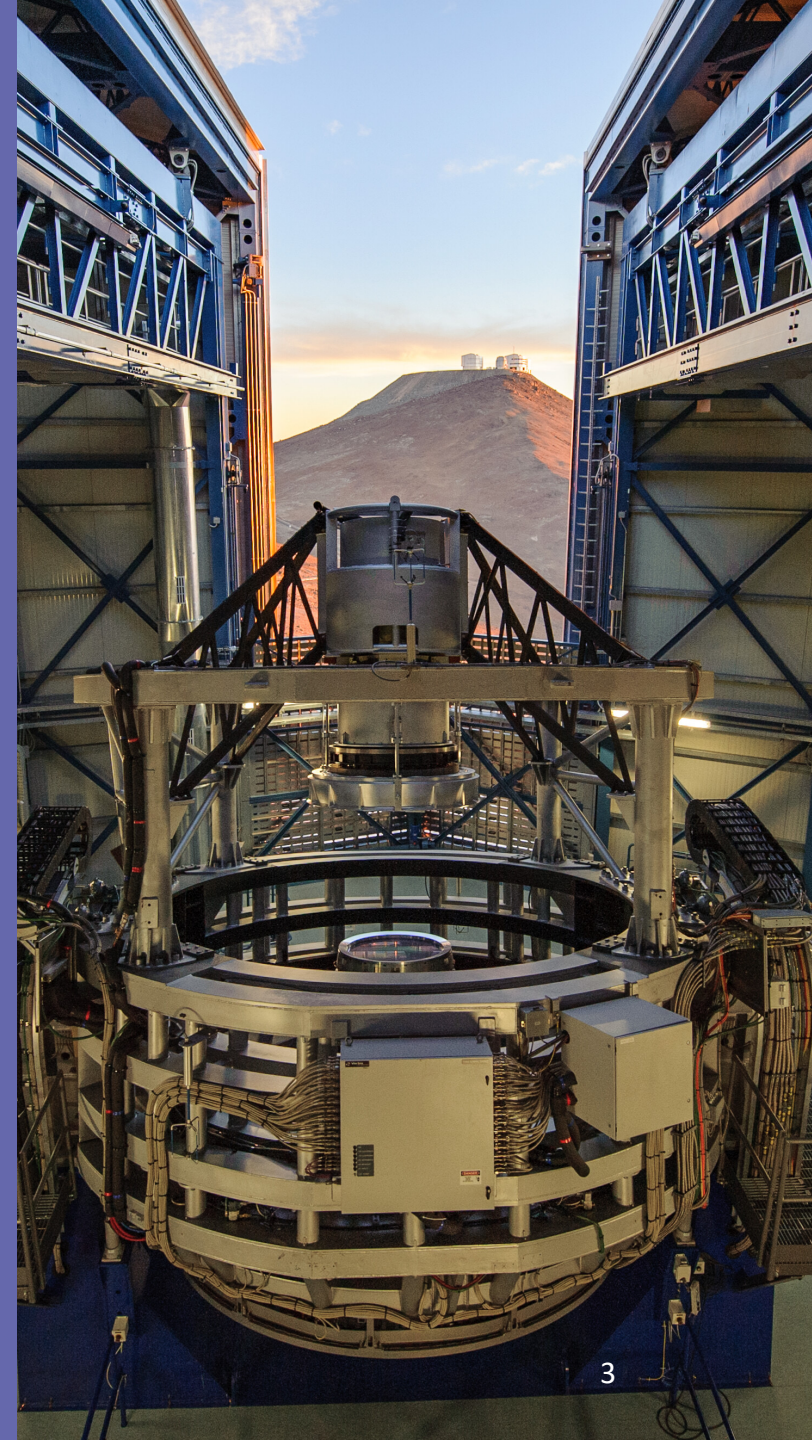
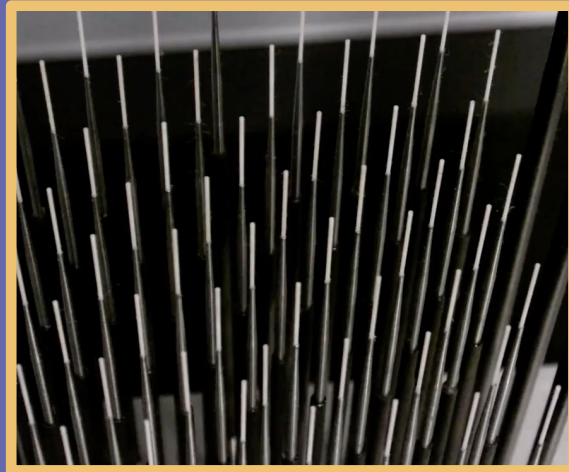


Transient Discovery



4m Multi-Object Spectroscopic Telescope (4MOST)

- Fibre-fed spectroscopic survey
 - ~2,400 fibres
- Mounted on VISTA telescope
- ~4 square degree FoV
- Low-res: $R \approx 4000 - 7500$
- High-res: $R \approx 18000 - 21000$
- 18 surveys
 - Galactic and extragalactic science
- 5-year survey covering entire southern sky
- Survey starts Autumn 2024



TiDES

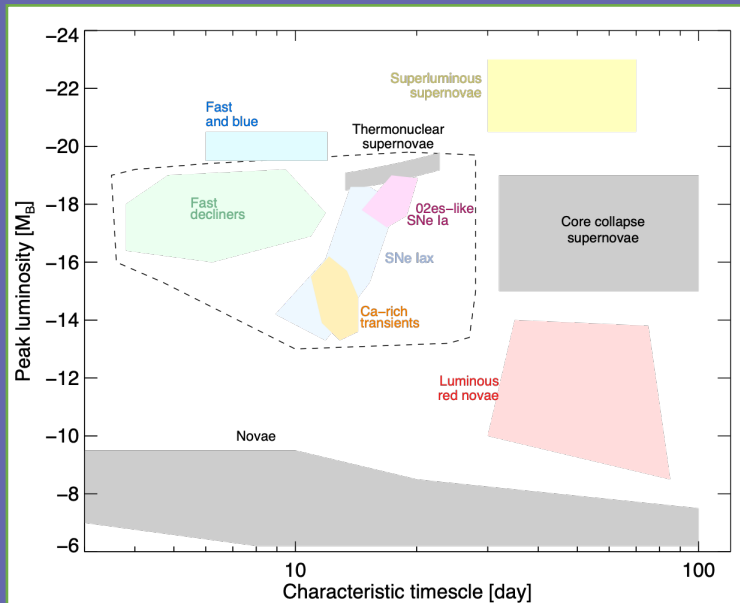
- Sub-survey of 4MOST
 - ~250,000 hours of fibre-time
- Focused on the industrialisation of transient spectroscopic follow up
 - Live transients
 - Host galaxies of faded transients
- Transient consortium: Southampton, Lancaster, Portsmouth, Belfast
 - Many other members across UK+European institutes
- LSST will feed most targets
- Enough fibre-hours to target all live-SN in any 4MOST pointing.
- ~10 live and bright SNe in any given 4MOST pointing



TiDES Science Goals

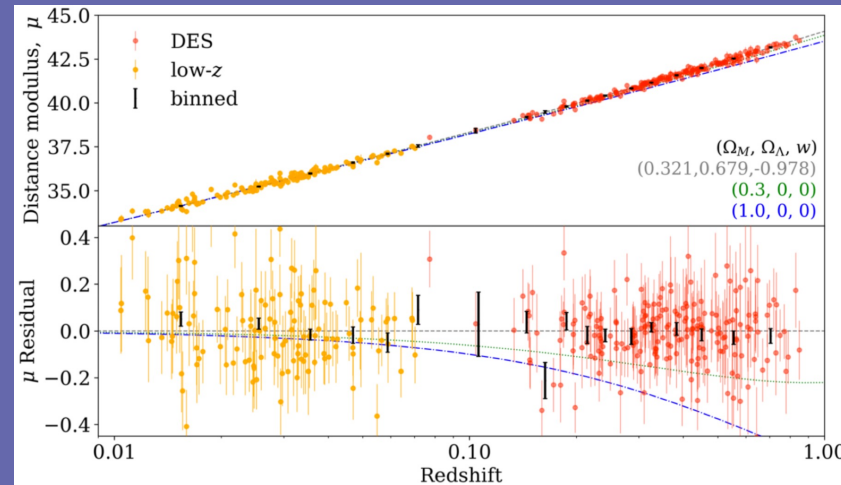
1

Map the diversity of the transient universe



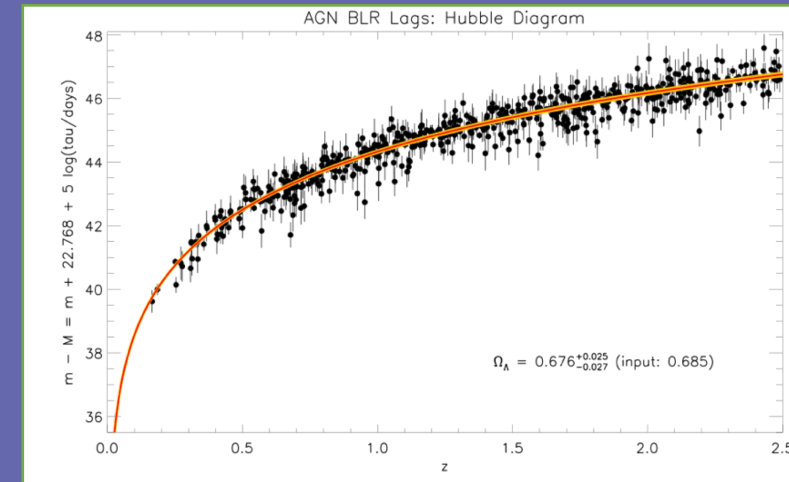
2

Dark Energy experiment with type Ia SNe



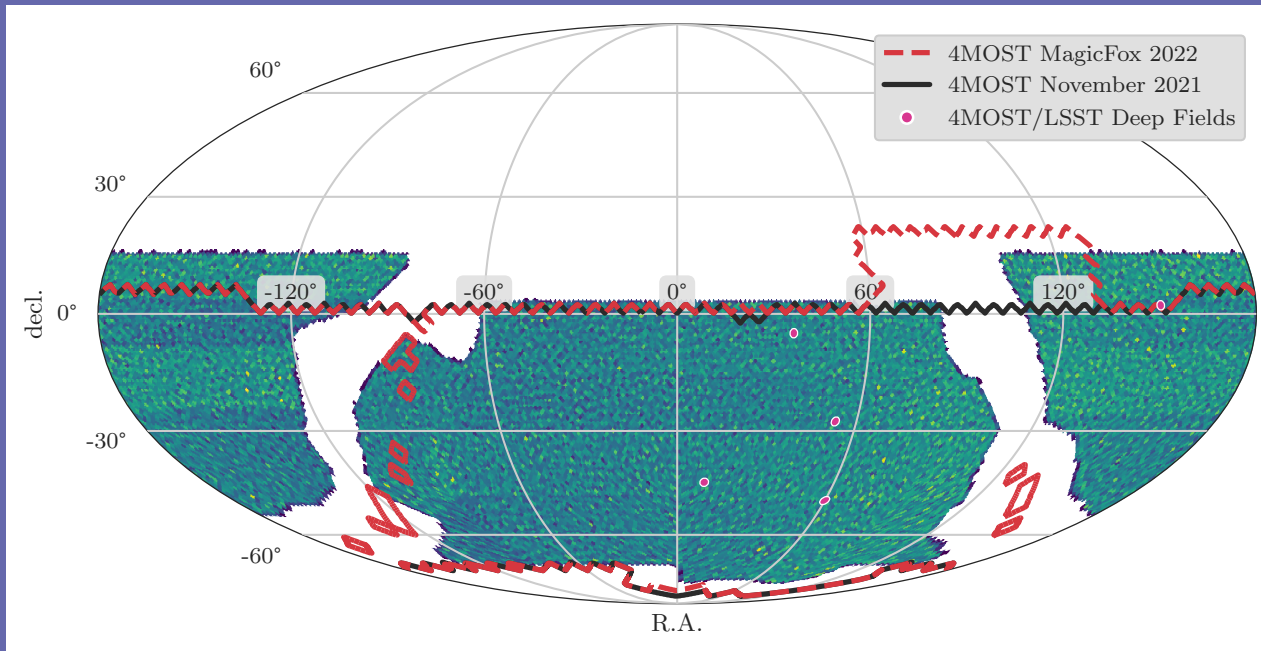
3

AGN Reverberation Mapping

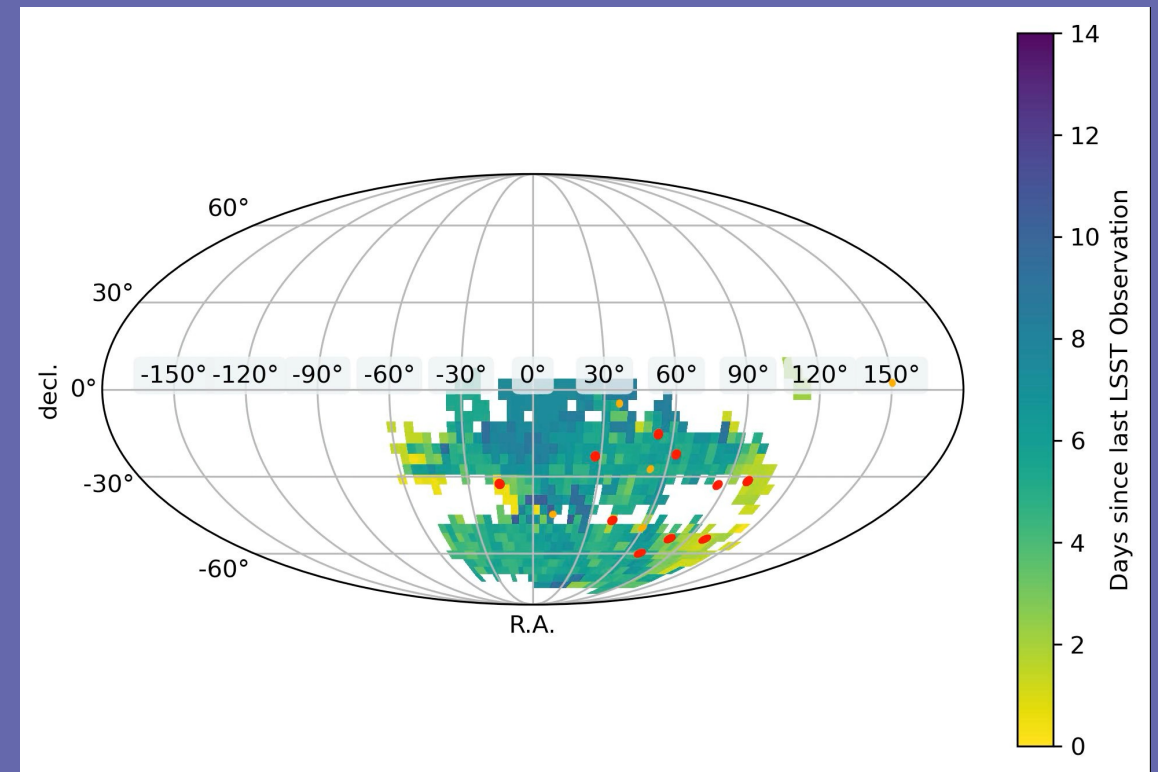


What I do

- Work on LSST simulations, producing mock SN catalogues for 4MOST
 - Work with 4MOST strategy teams to optimize a strategy
- Develop software to bridge LSST alert brokers with 4MOST

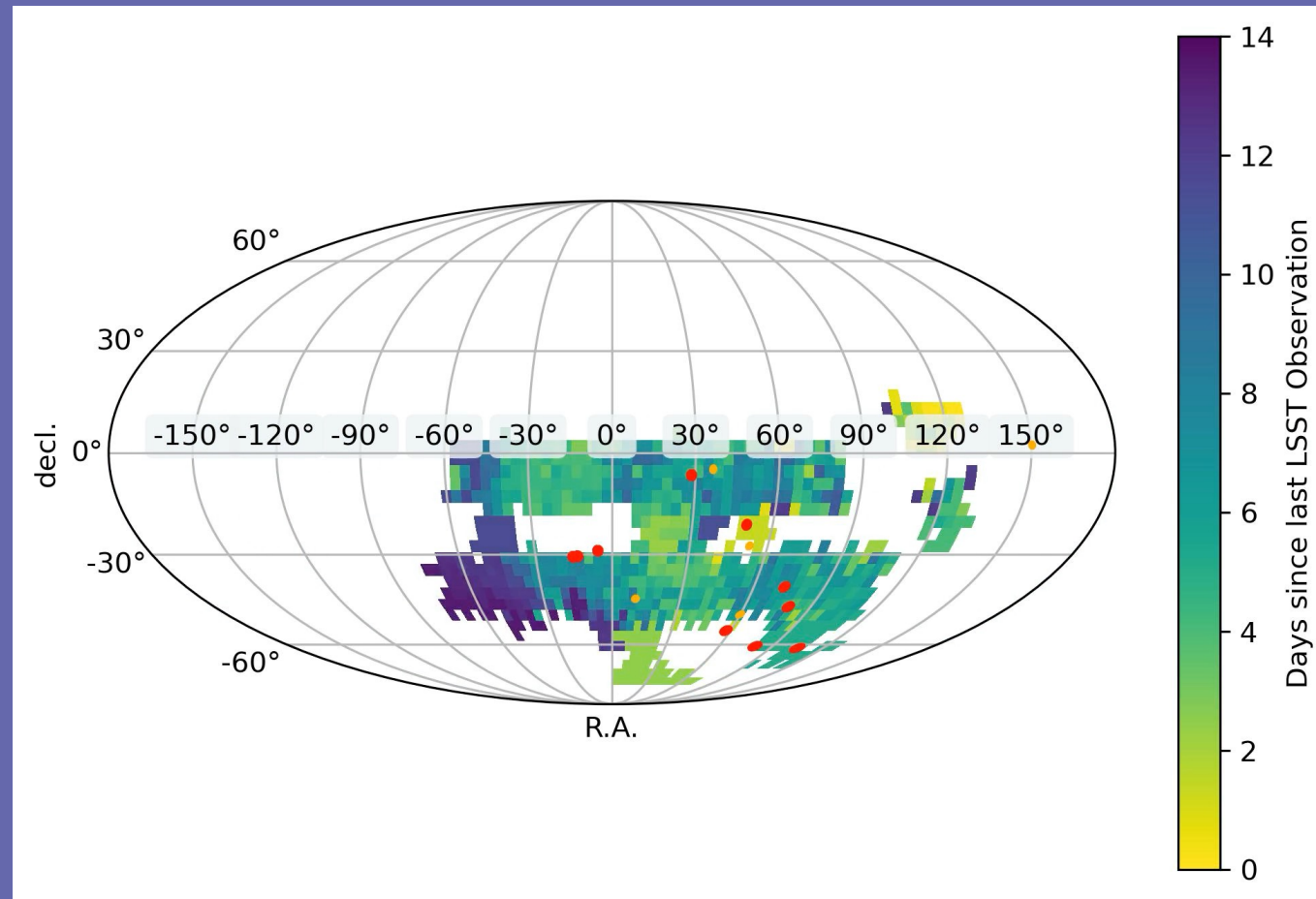


Colour scale: Number of LSST Baseline v2.0 observations

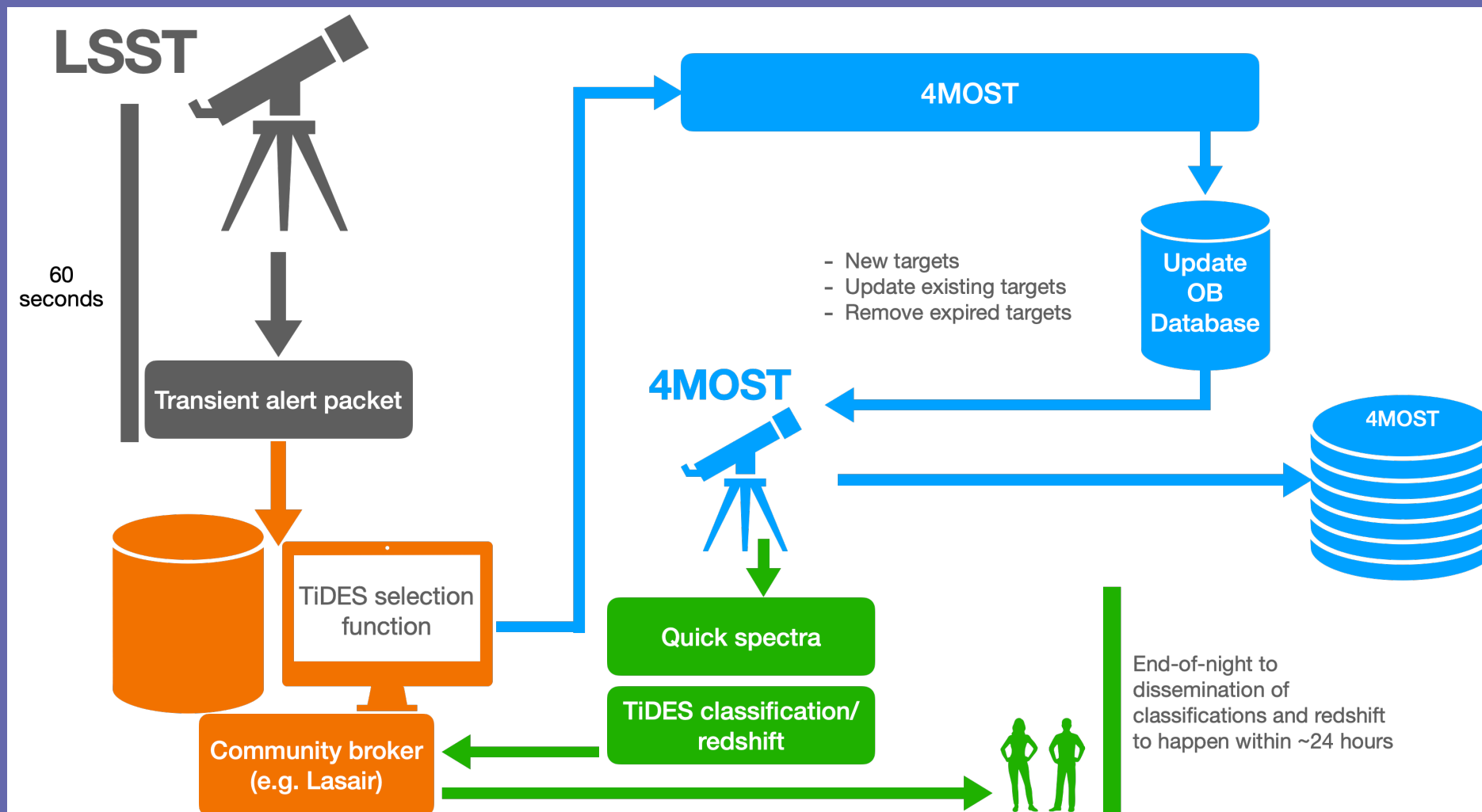


Optimising

- LSST rolling cadence + 4MOST strategy

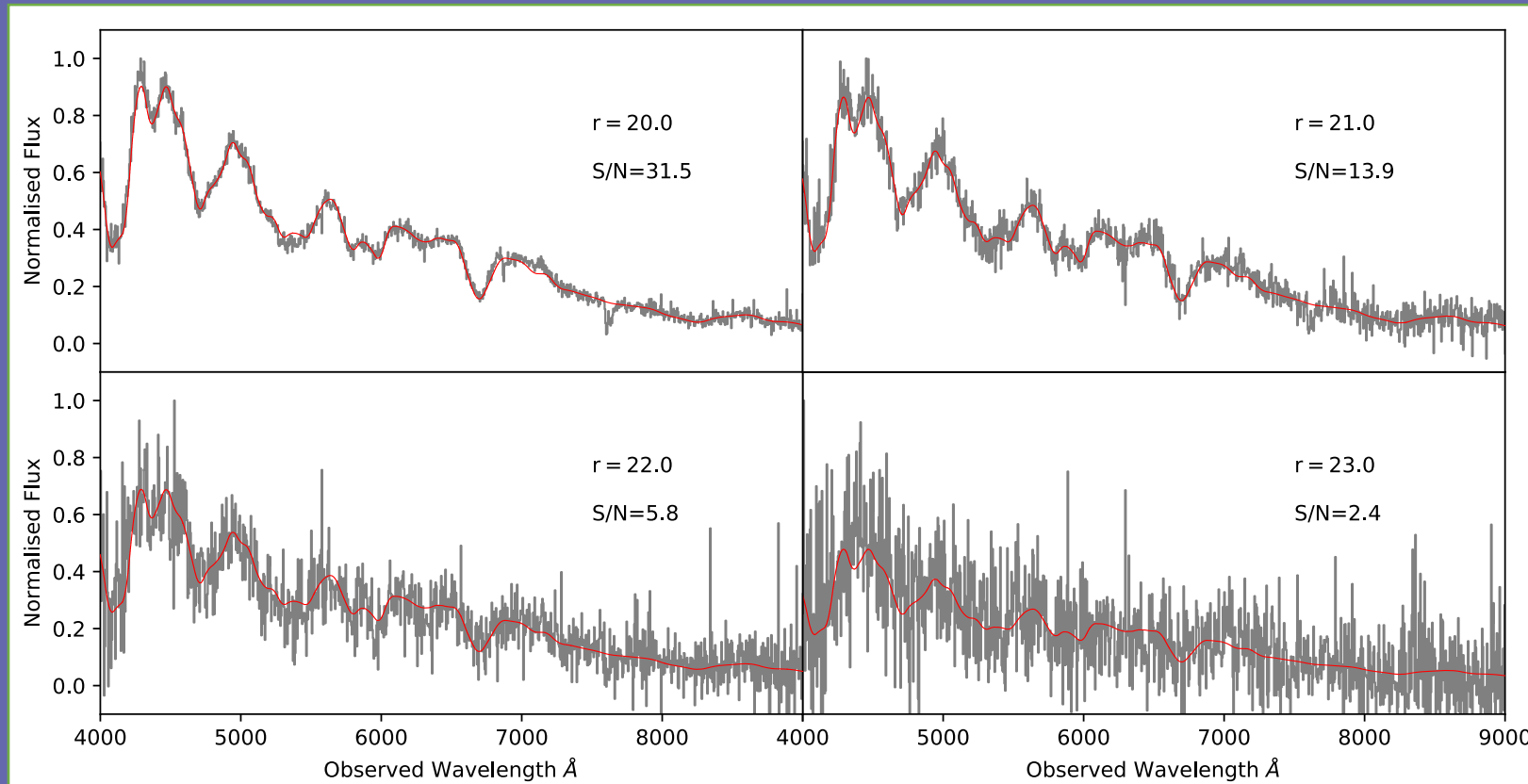


Workflow

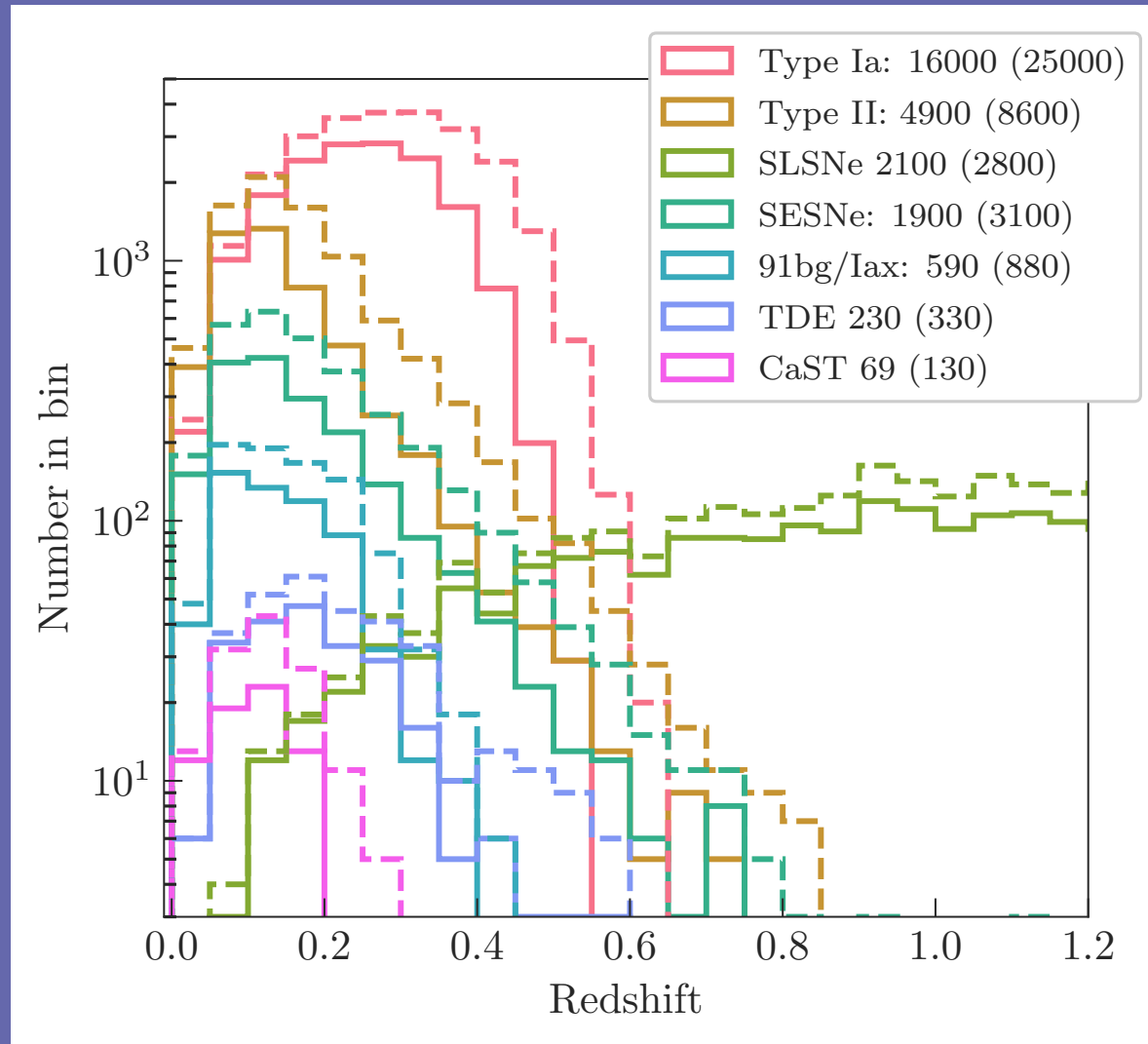


4MOST Spectra

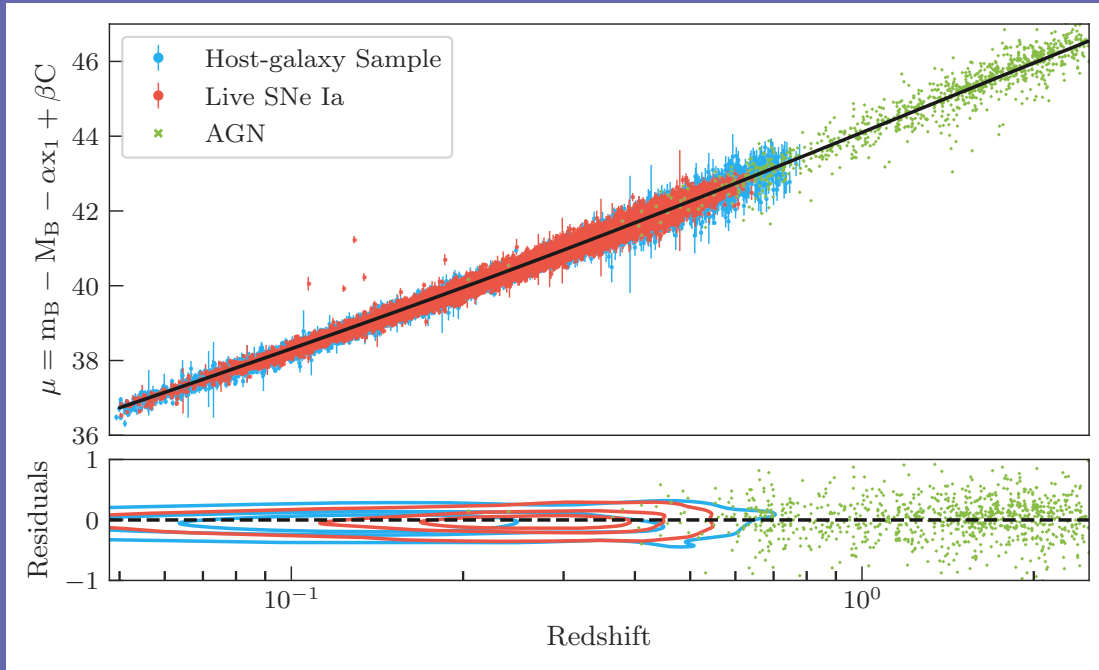
- 1 hour exposure time
 - (Latest simulations have 40 minutes of integration time)



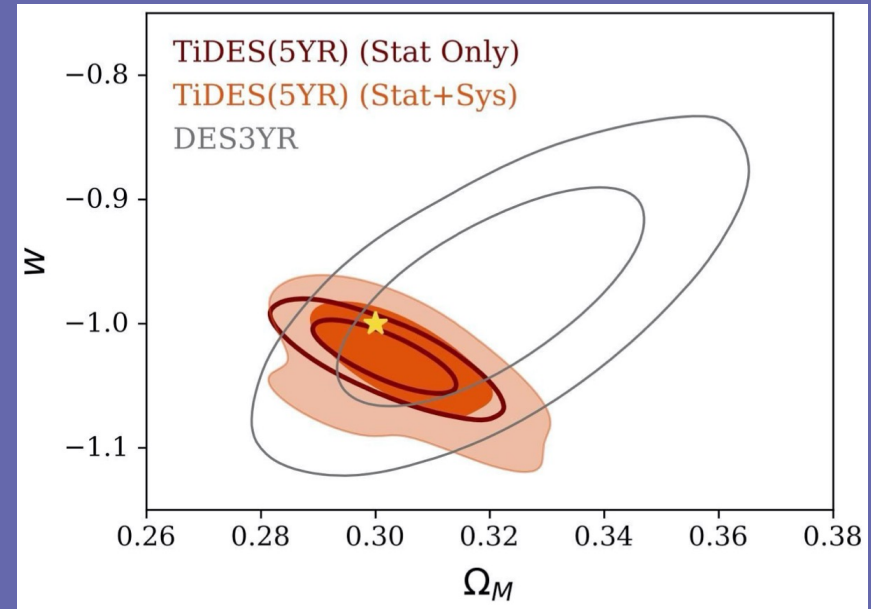
Expected live transients



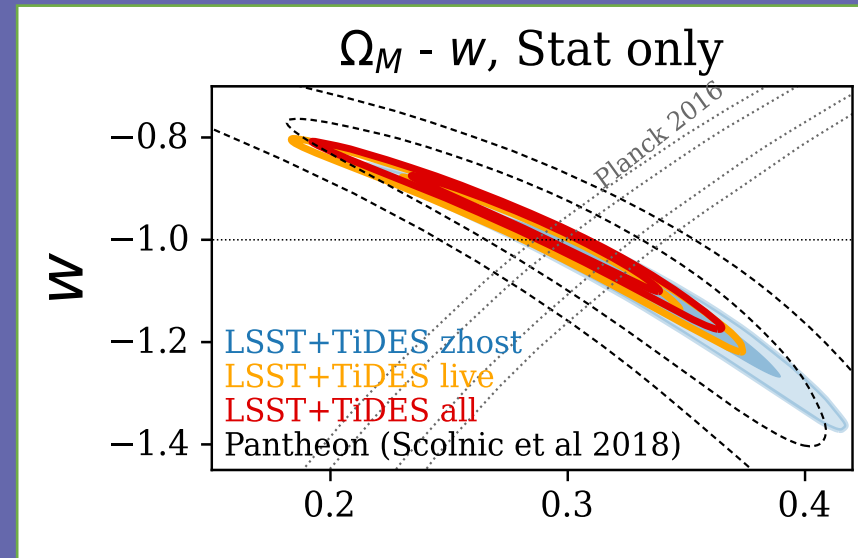
Cosmology



- ~ 20,000 live SN Ia
- ~ 30,000 host galaxy redshift (conservative estimate, will improve in future simulations)
- 725 AGN in the DDFs



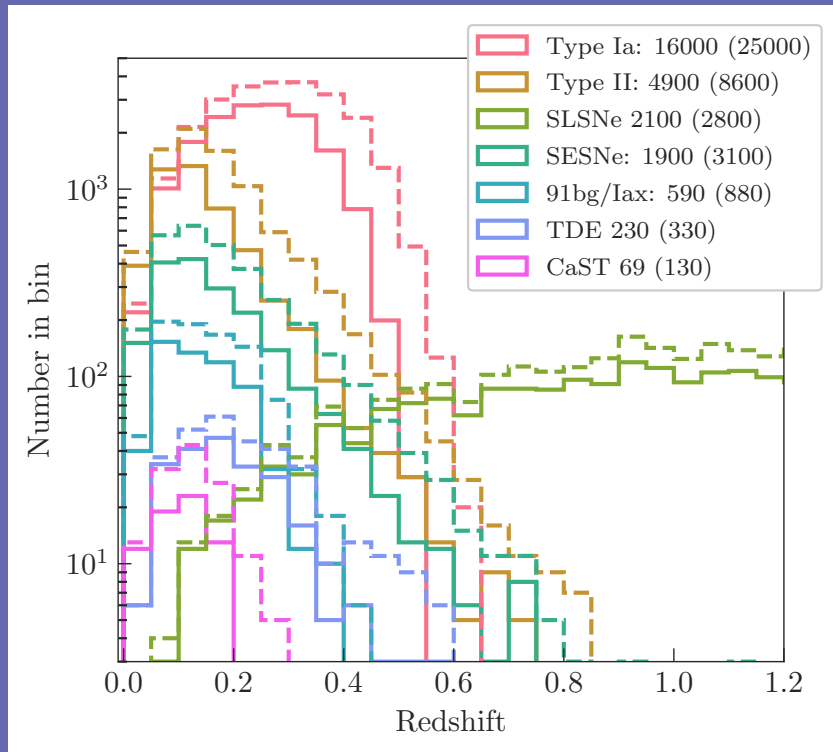
Live SN only



Live + hosts

1

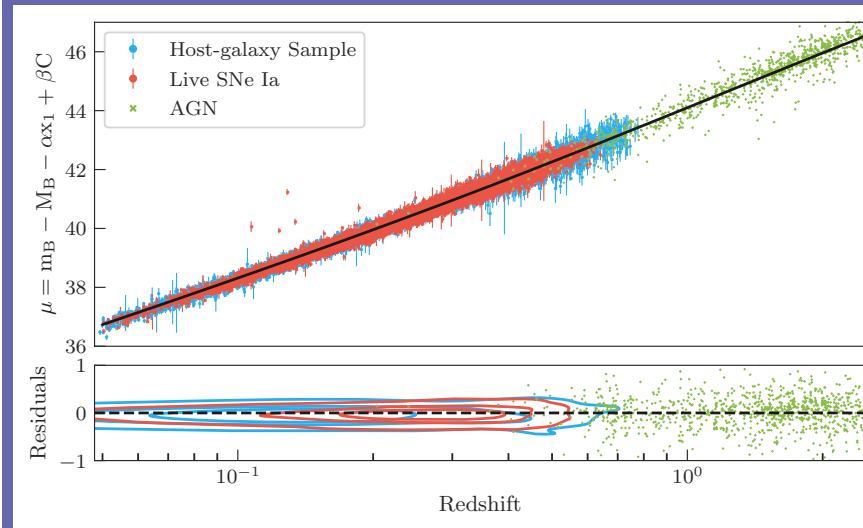
Map the diversity of the transient universe



>40,000 transients

2

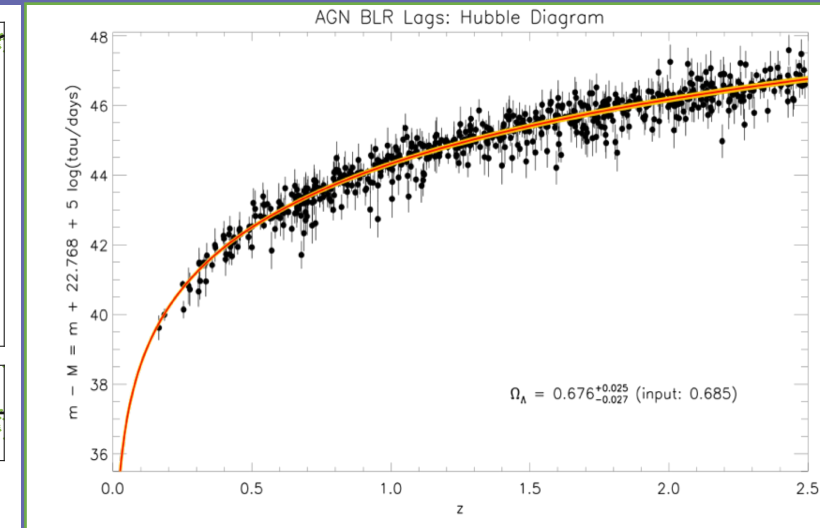
Dark Energy experiment with type Ia SNe



>50,000 redshifts on a Hubble Diagram

3

AGN Reverberation Mapping



~1,000 AGN to z = 2.5