The Diversity and Ubiquity of Relativistic Jets

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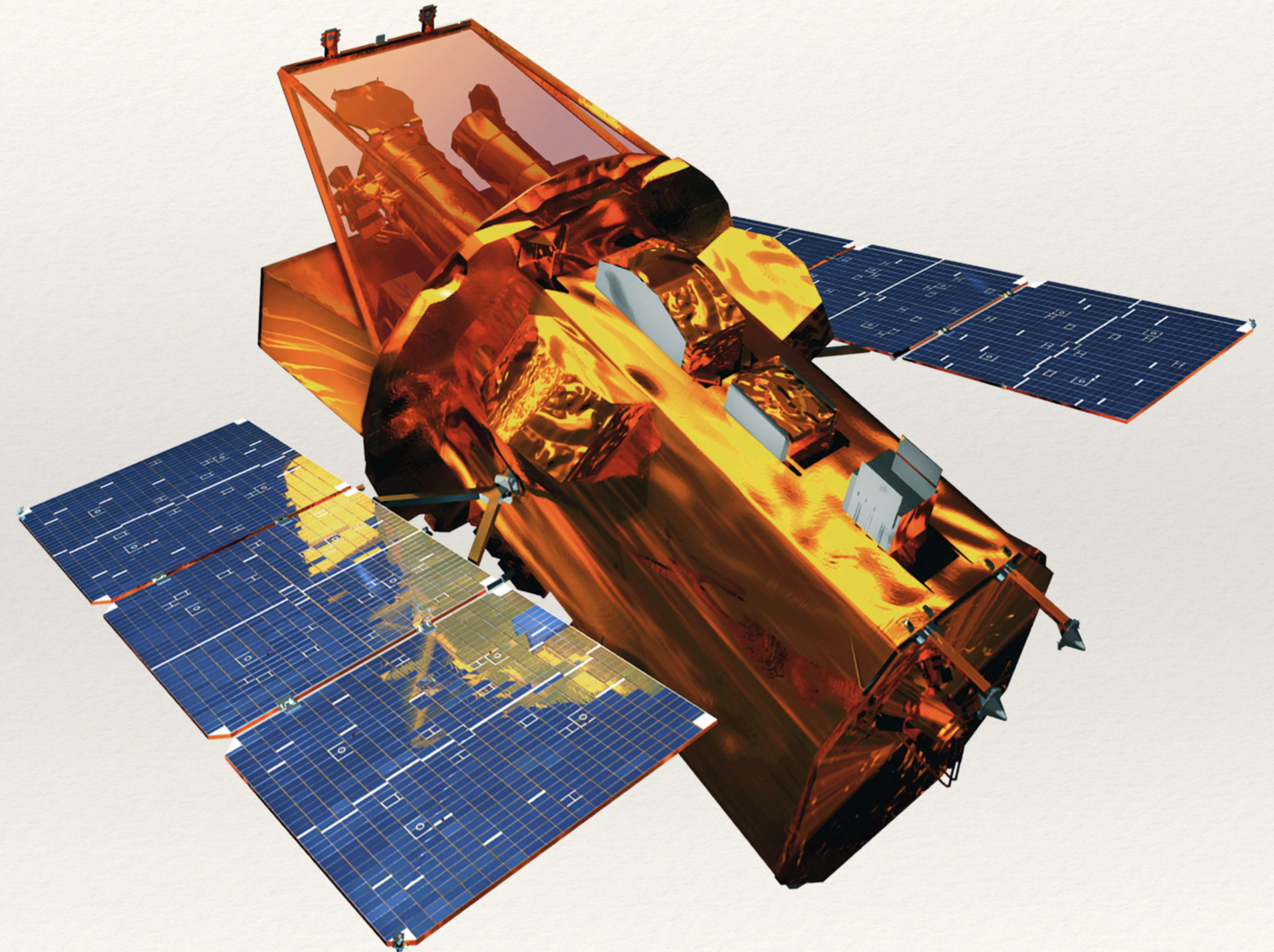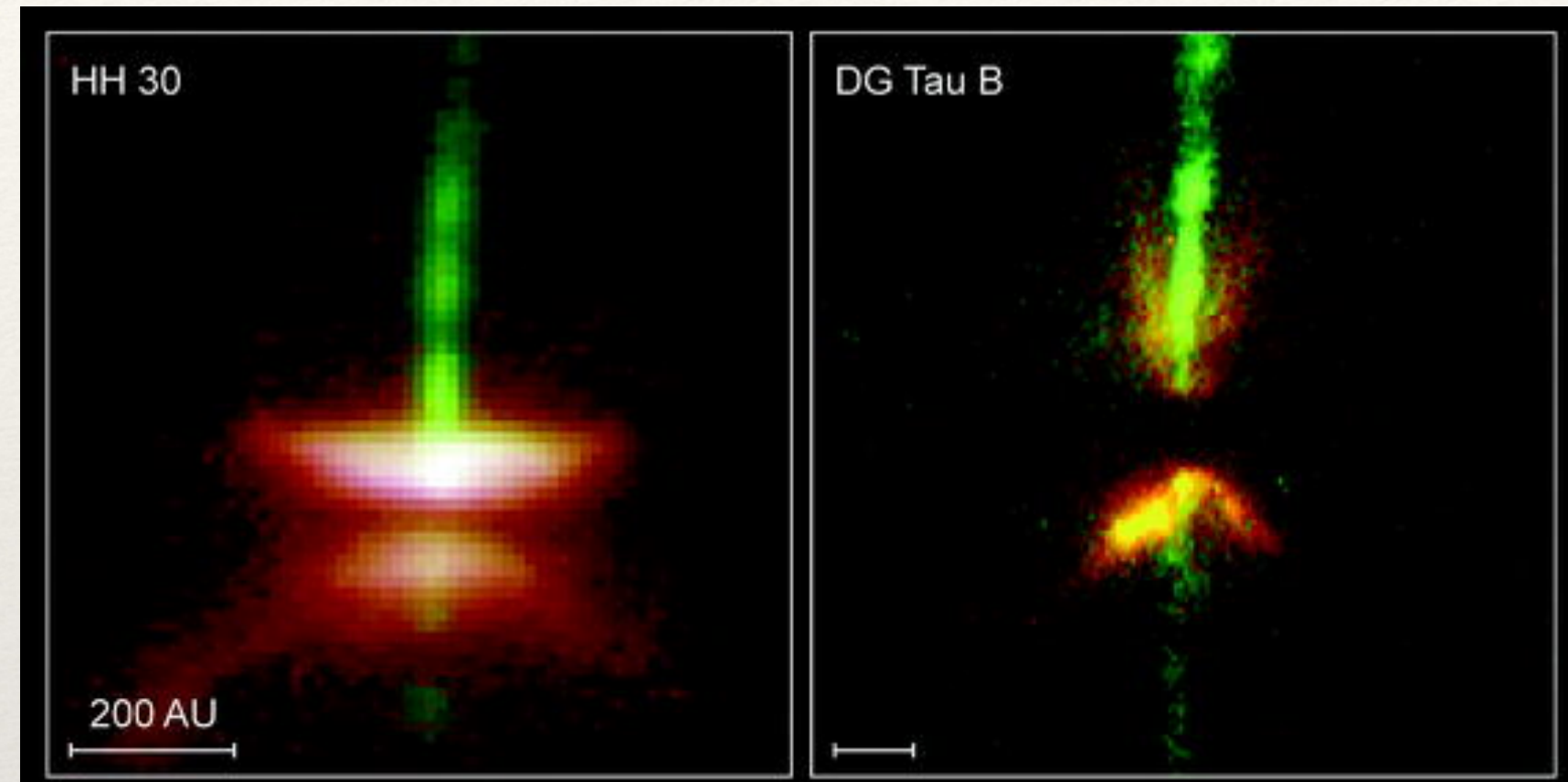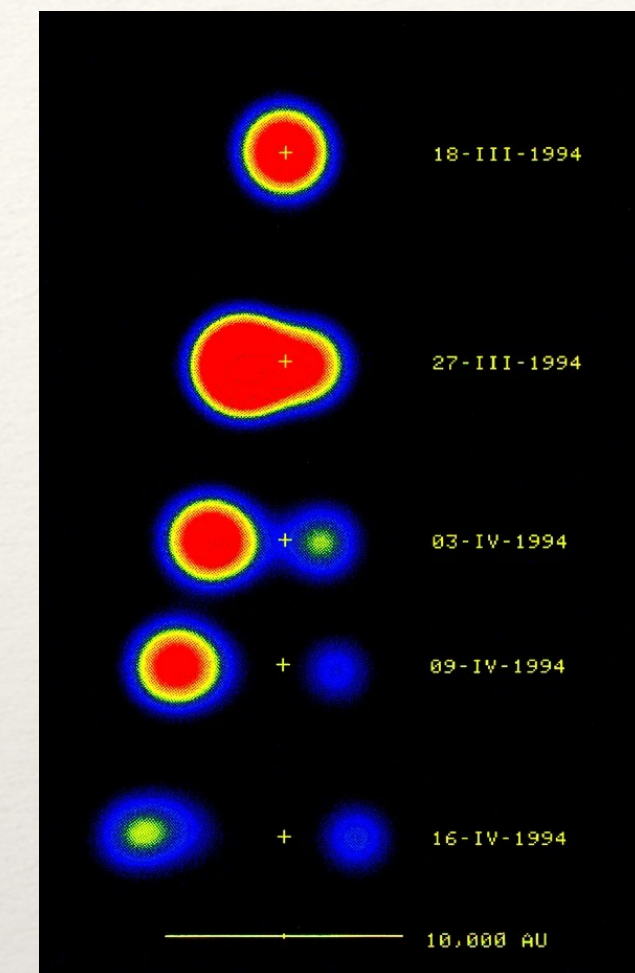# Introductions

- ❖ Research Astrophysicist at NASA's Goddard Space Flight Center (Greenbelt, MD)

- ❖ Adjunct Professor at University of Maryland, College Park and George Washington, University

- ❖ Principal Investigator of *Neil Gehrels Swift Observatory*

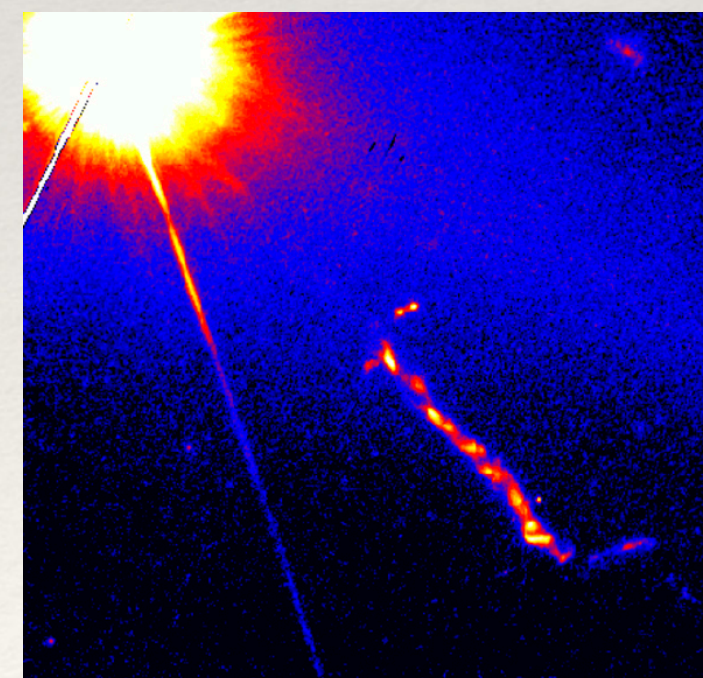- ❖ Member of Zwicky Transient Facility science collaboration
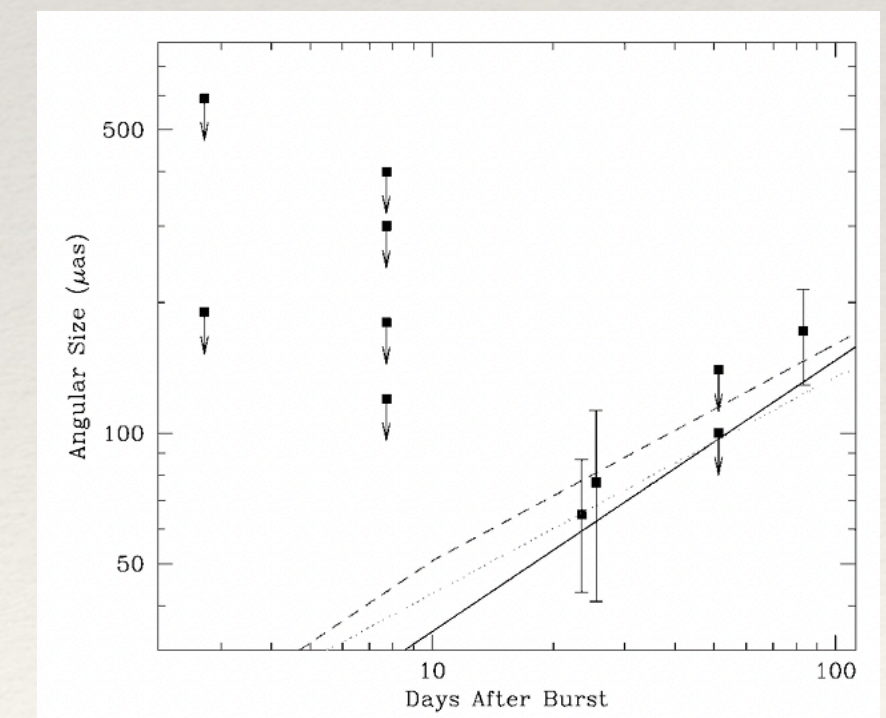
Science Interests

Protoplanetary disks (v ~ 100 km/s)

"Micro"quasars
(Γ ~ few)

[Mirabel+2004]

Blazars
(Γ ~ 10)

Gamma-ray Bursts
(Γ ~ 100)

[Taylor+2004]

What astrophysical systems are capable of generating relativistic ejecta, and why?

Working Group Activities
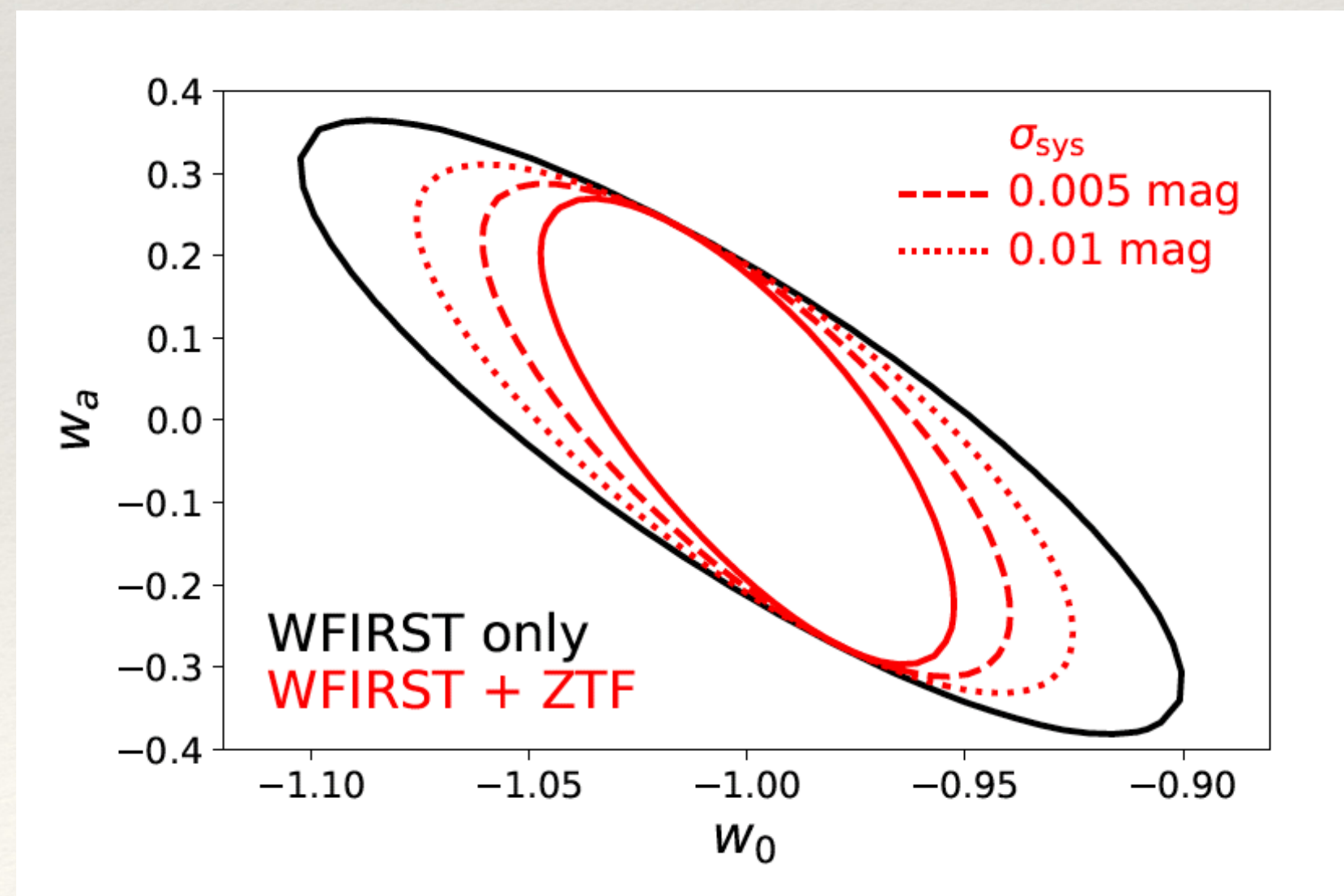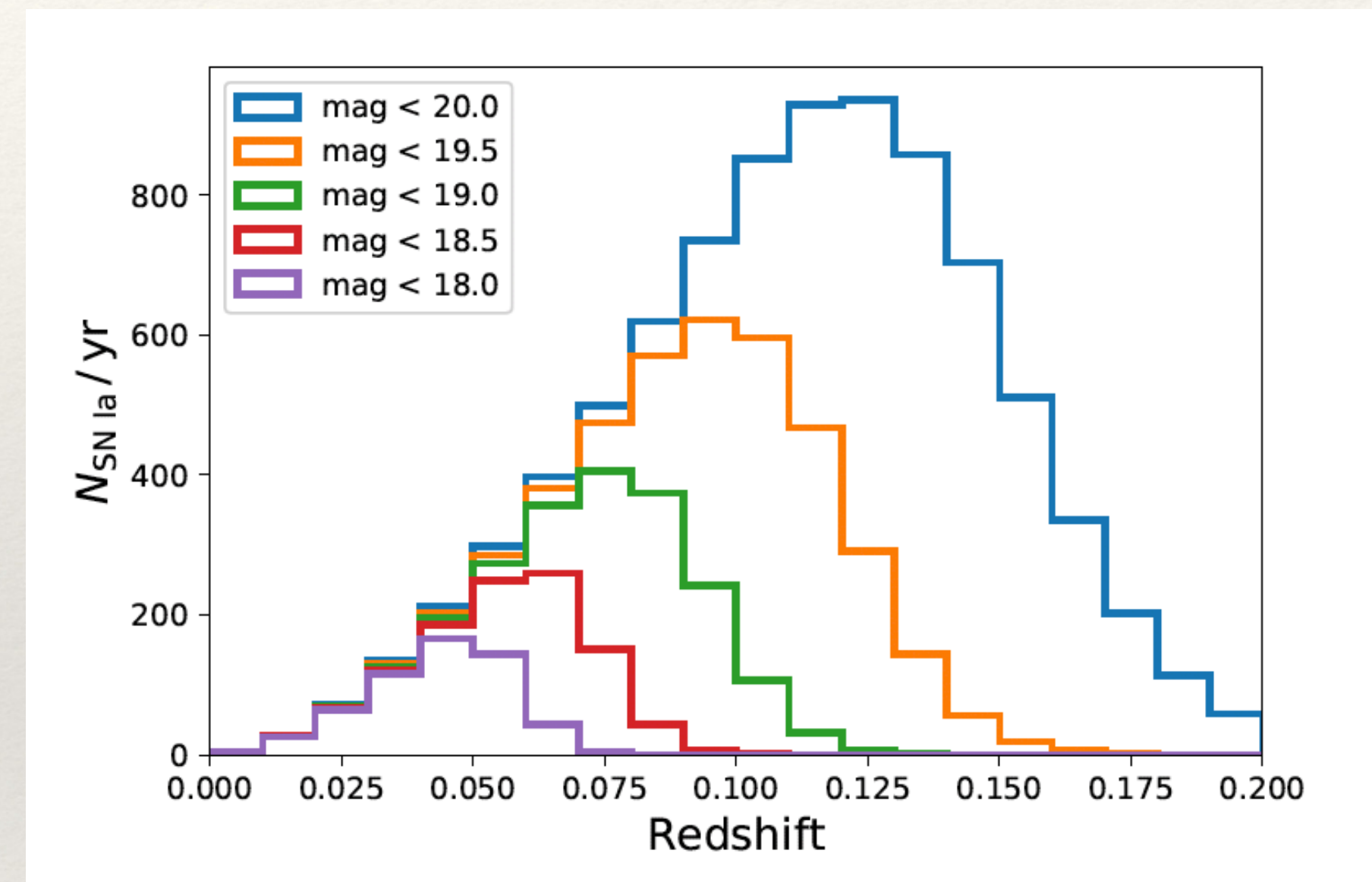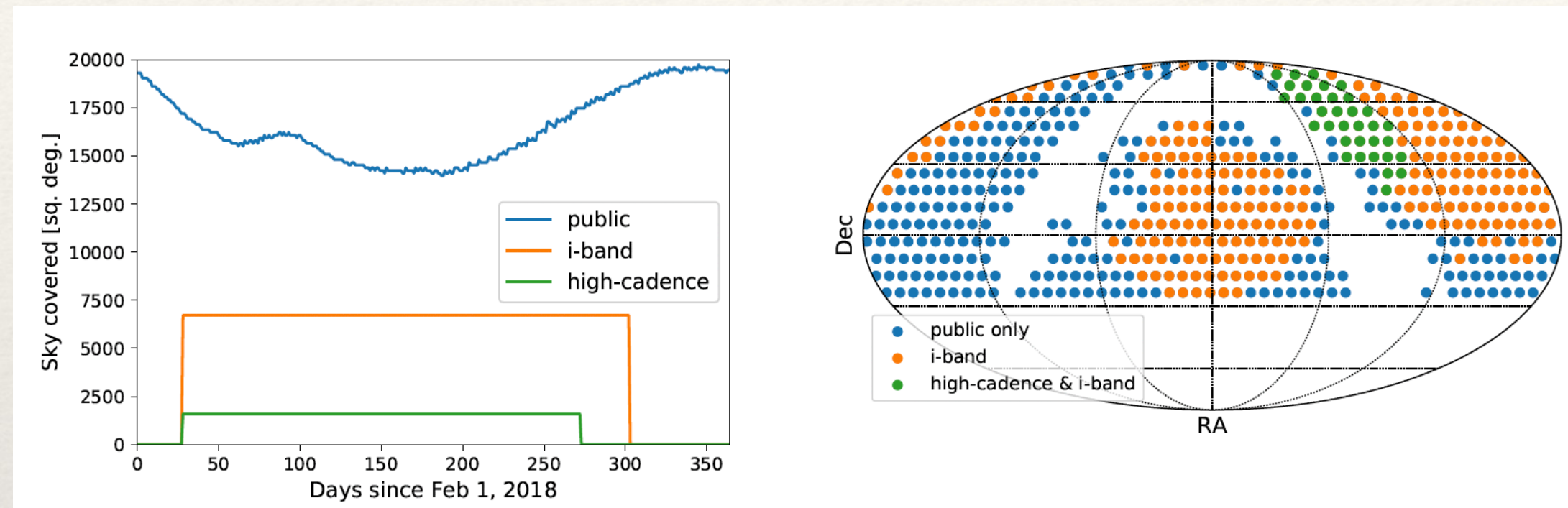
❖ Rate Estimates

❖ Simulated Light Curves

❖ Galaxy Redshift Catalogs

❖ Automated Swift triggering

❖ Photometric Calibration

Rate Estimates

- Current rate estimates range from:

  - 0.1% of CCSN rate (Ho+2023)

  - 4-7% of CCSN rate (Drout+2014)

- Relative vs. Absolute rate estimates

- Proper estimate of ZTF recovery fraction (fake injections, end-to-end recovery, …)
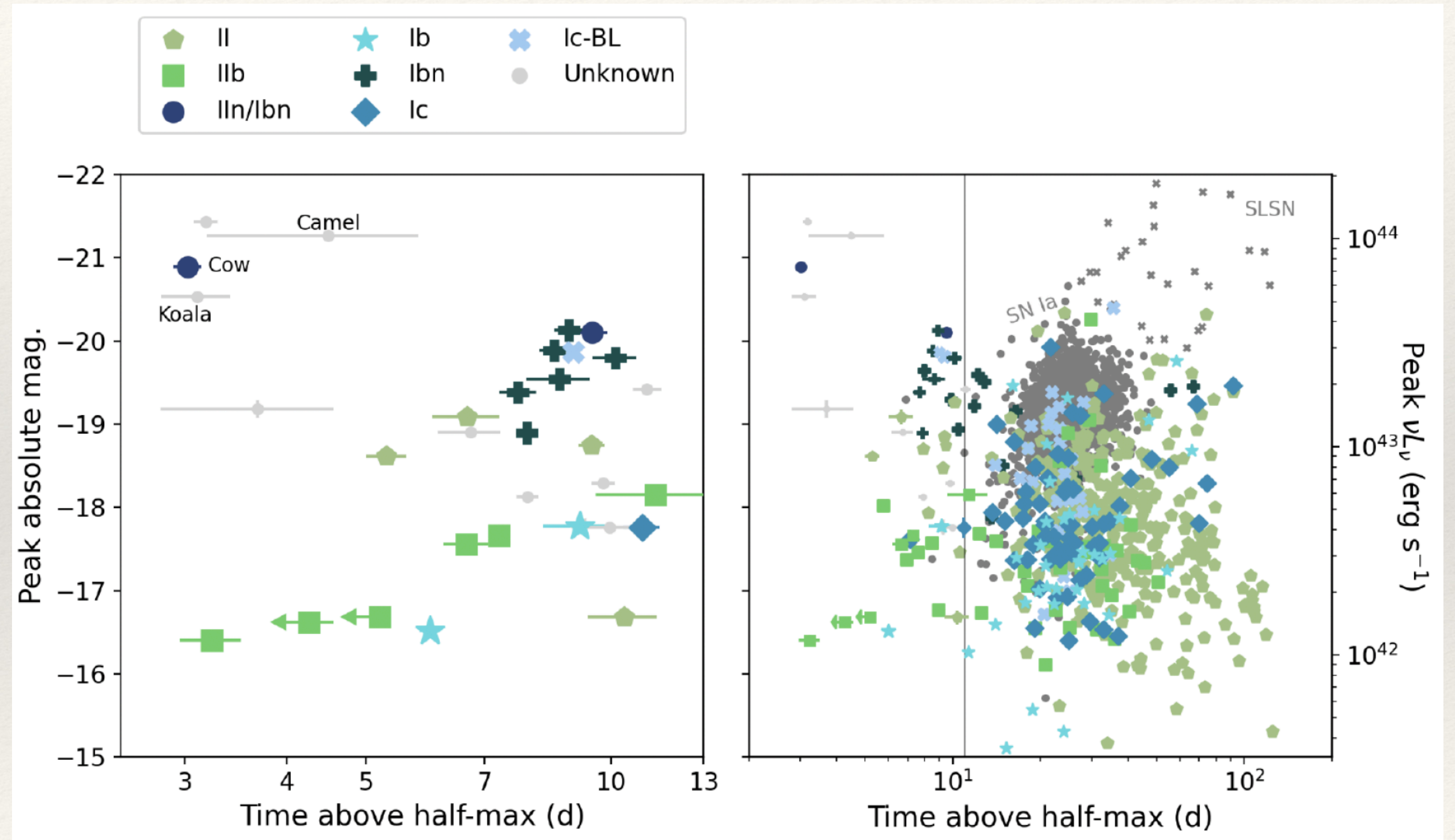

Ho+2023
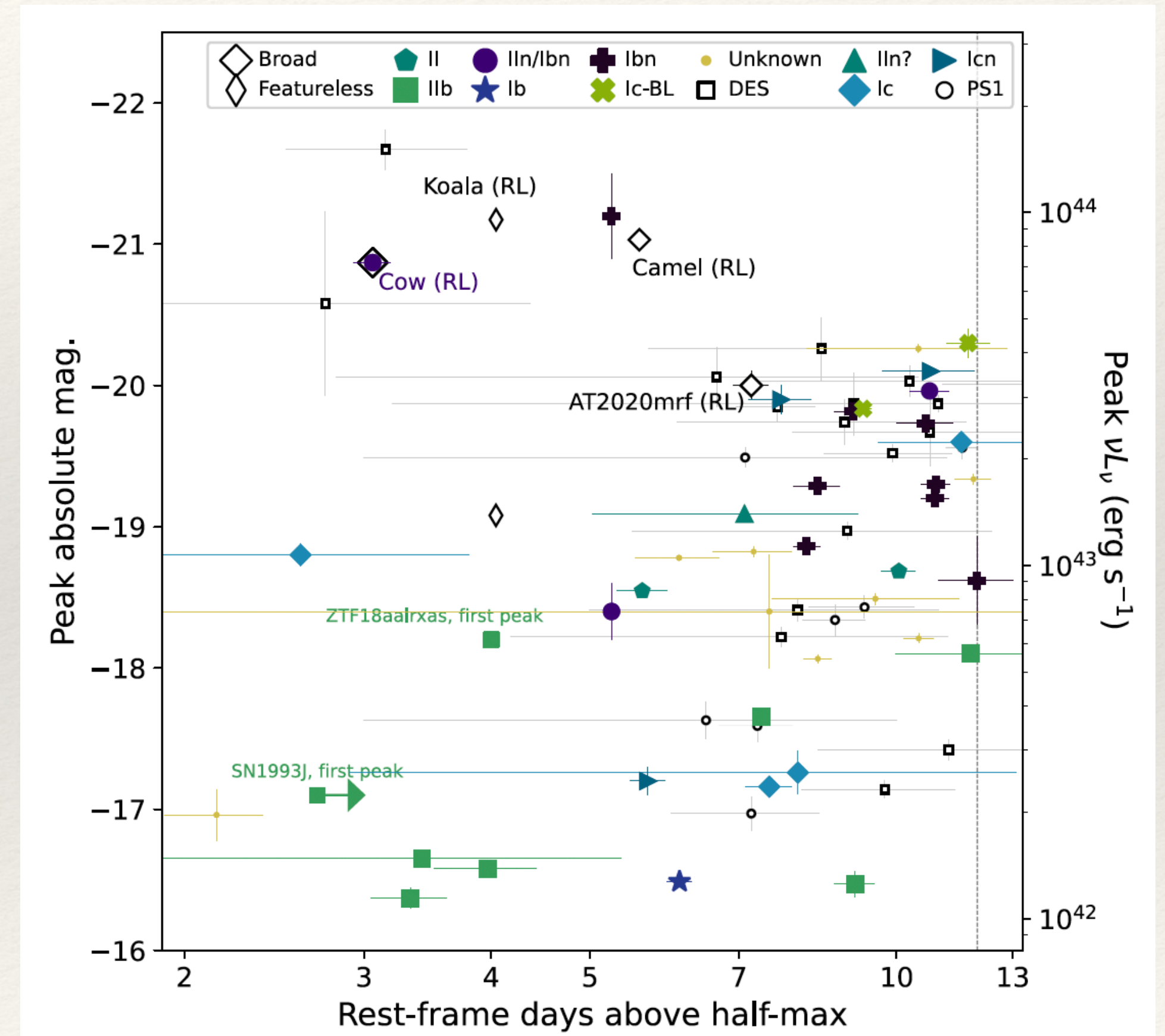
Simulated Light Curves

Galaxy Redshift Catalog

- ❖ Prompt follow-up requires luminosity estimate

- ❖ Generate redshift catalog for Ecliptic pole fields

 - ❖ Potentially request additional spectroscopic redshifts

Ho+2023

Automated Swift Triggering

- Critical model discriminators provided by early-time UV light curves **and color evolution**

- *Swift* has recently developed real-time (< 1 min) target-of-opportunity (ToO) uplink

- Existing ToO API allows automated request submission

    - Automated filter for LFBOTs
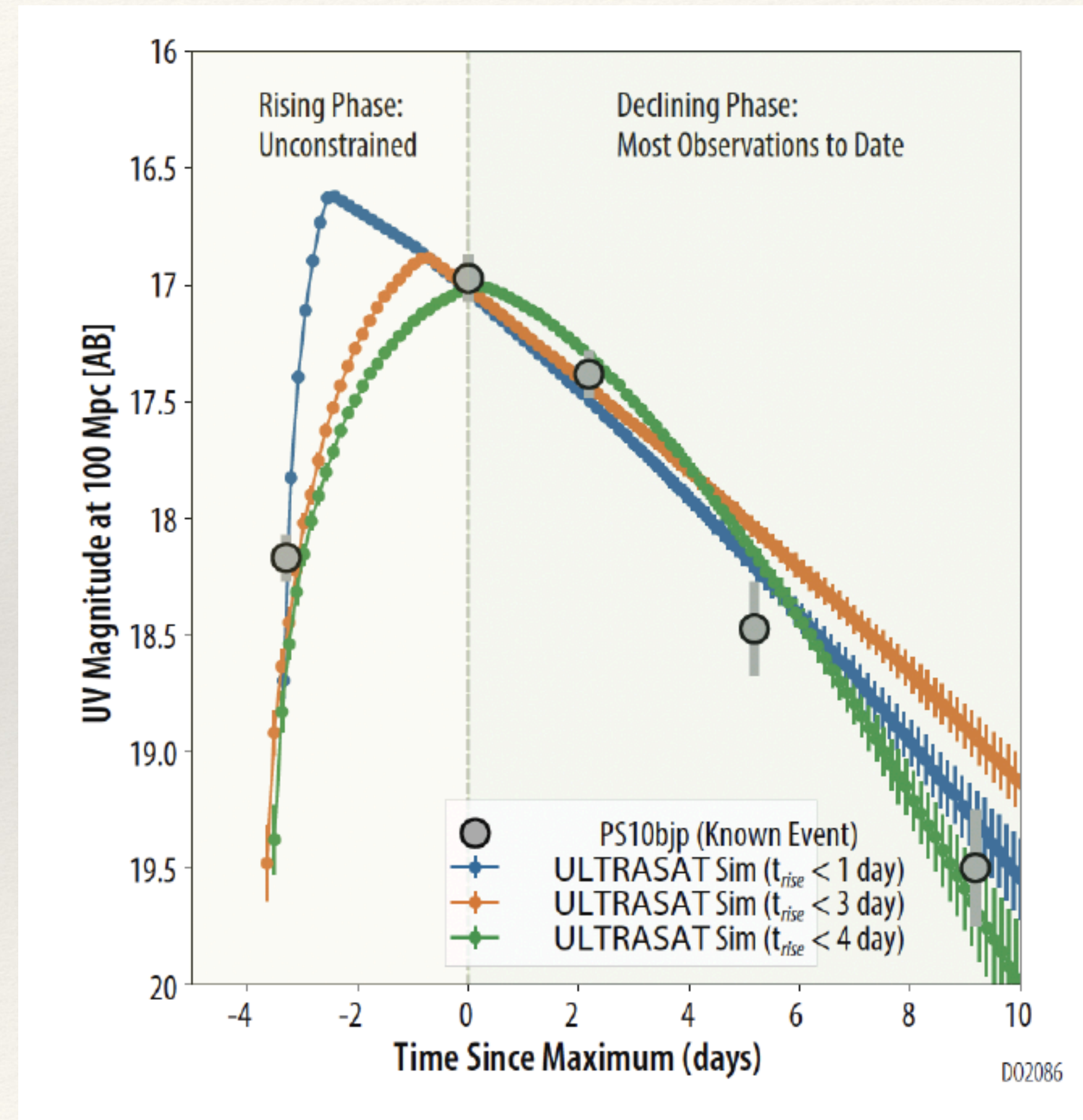
Photometric Calibration
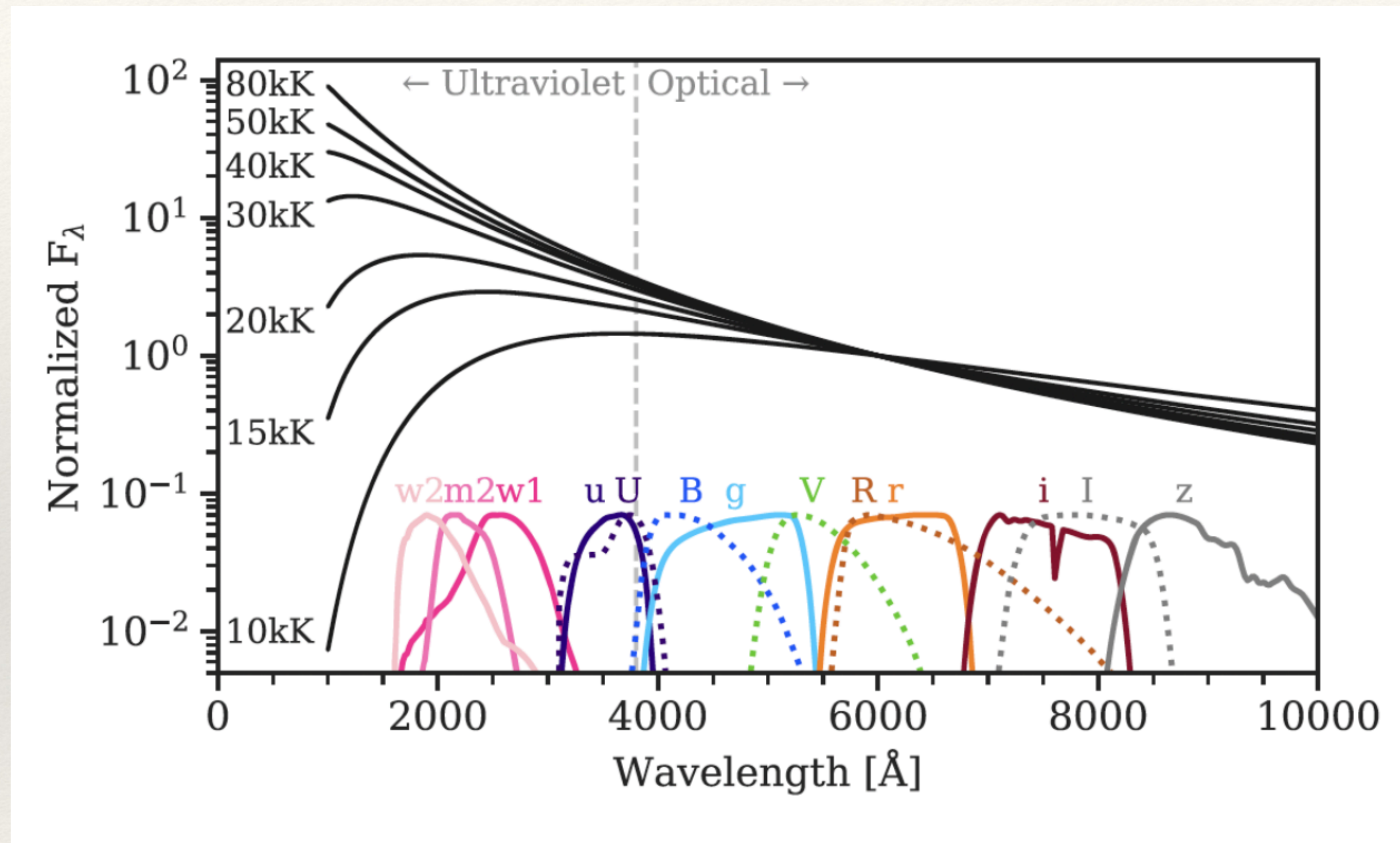
Arcavi 2022

Define preparatory and commissioning observations with *Swift* to optimize ULTRASAT photometric calibration

Summary

- ❖ ULTRASAT will be extremely powerful to characterize the landscape of relativistic explosions

- ❖ There is a lot of work to do to prepare for this!

- ❖ Come join us!