

# ZTF-II: Science (& Technology) Drivers

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# ZTF-II is a public-private project

- National Science Foundation (MSIP grant), \$5M
- Global Partnership:
  - TANGO, Taiwan
  - Weizmann Institute of Science, Israel
  - Oskar Klein Centre, Sweden
  - Humboldt University & DESY, Germany
  - INP23, France
  - Trinity College Dublin, Ireland
  - University of Maryland, College Park
  - University of Wisconsin, Milwaukee
  - Lawrence Livermore National Laboratory
  - IPAC
  - Caltech

# The driving force behind the PTF→ZTF sequence

- *“I soon became convinced... that all the theorizing would be empty brain exercise and therefore a waste of time unless one first ascertained what the population of the universe really consists of” – Fritz Zwicky*
- Discovery is purely a function of technology (& algorithms)
- Automation → efficient discovery
  - “The best way to do astronomy is to get out the astronomers out of the dome”

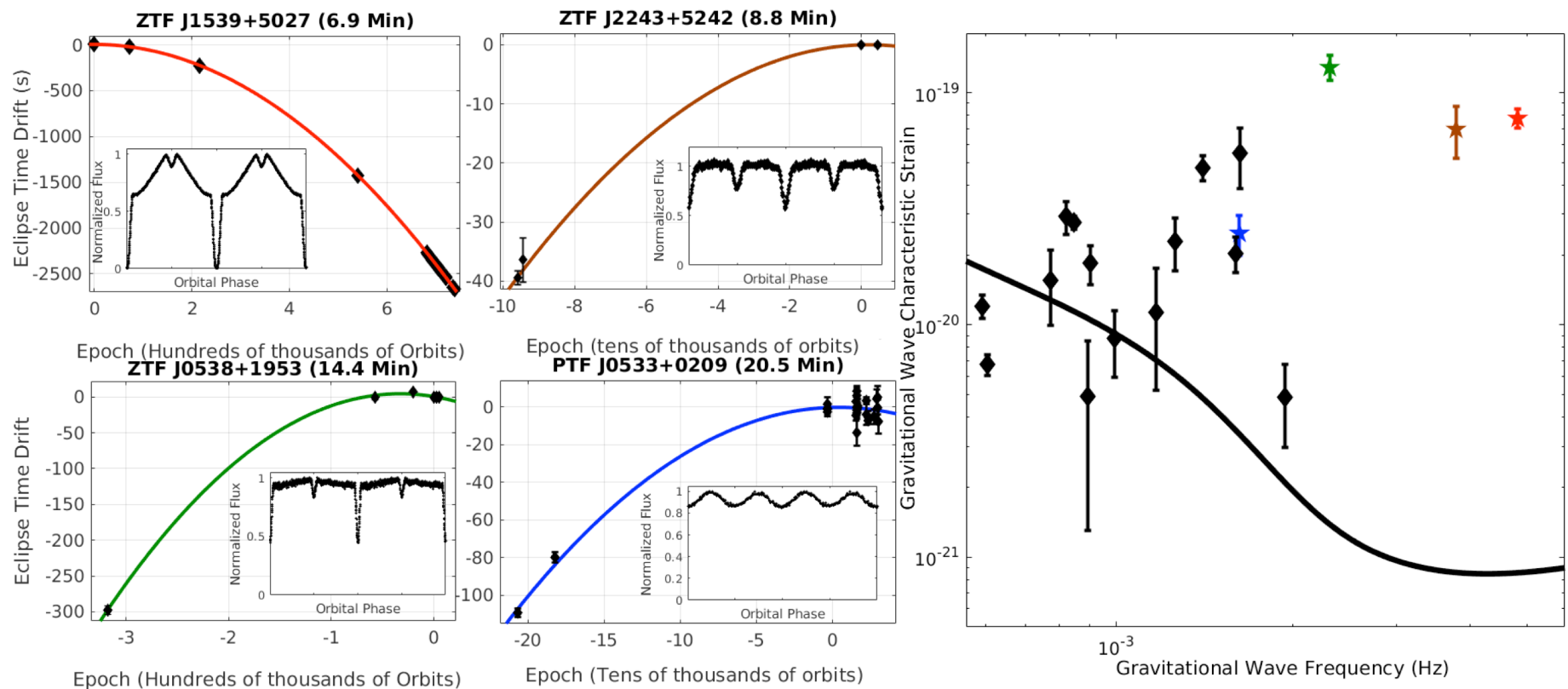
# Unbiased surveys have great value

- Historically, large survey with the fewest constraints have resulted in discoveries of new objects and discoveries of new patterns
- Detection is not the same as discovery, especially for known and abundant phenomenon
  - e.g. finding a rising source in the outskirts of a galaxy is most likely a supernova but has modest value
  - e.g. a detailed light curve (say 100 points) or spectrum (say few hundred points) is necessary to increase the value of this detection
    - highly cadenced light curves
    - spectral identification

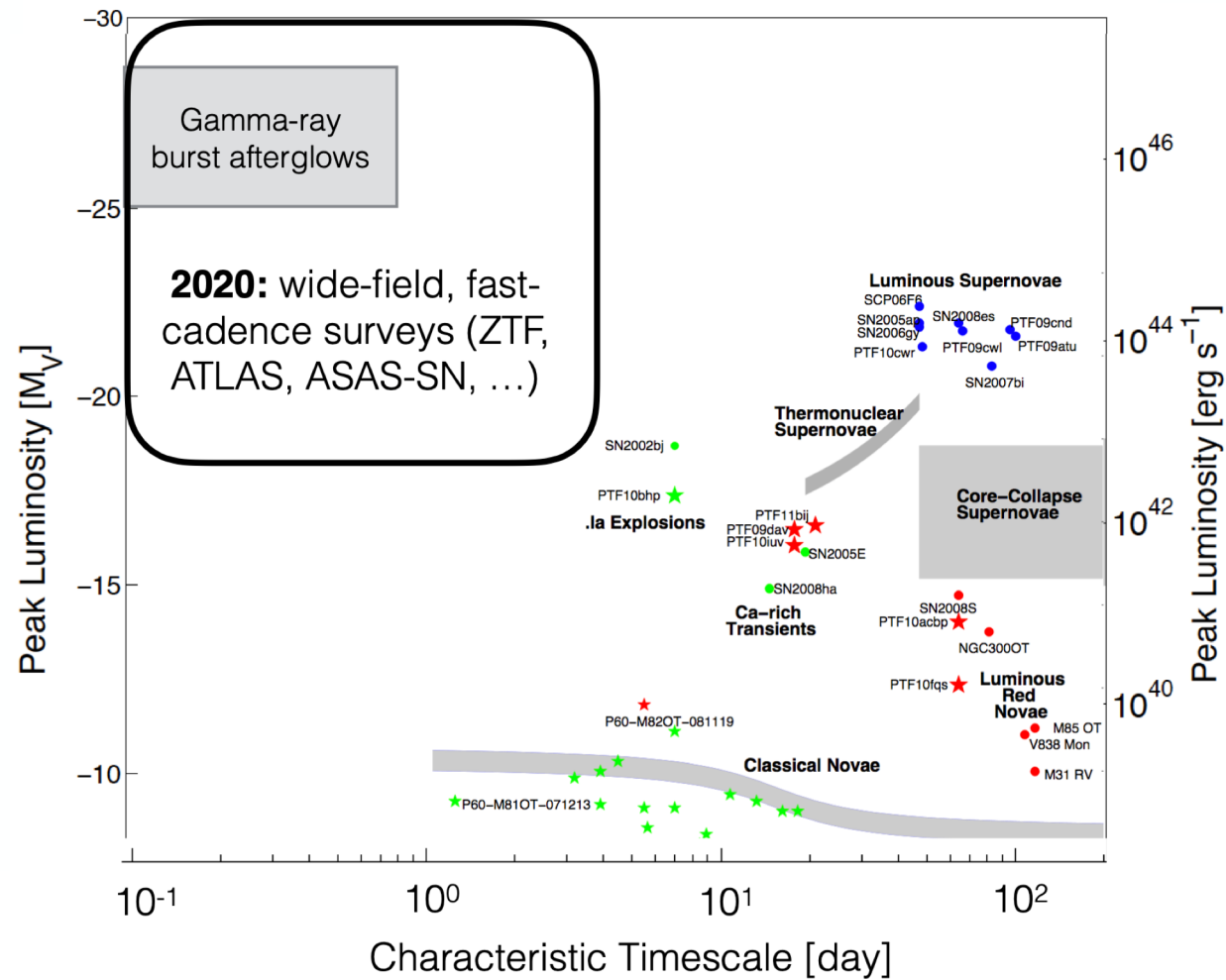
# The Public Surveys

- 50% of time on the 48-inch Oschin telescope+CCD camera
- 50% of time on the 60-inch telescope+SEDM spectrometer
- A uniform survey of the night sky over 2 nights (with one 30-s exposure in g-band and r-band)
  - Should produced nicely cadenced light curves of the Northern sky at 20 mag
- Spectrally classify 100 bright ( $<18.75$ ) transients per month
  - Upload data in near real time
  - Aiming for Machine Classification of spectra (thesis project)
  - Working towards SEDMv2 for the robotized Kitt Peak 84-inch telescope

# Stellar advances in stellar astronomy



## The Next Frontier: Fast & Luminous Transients



## Classification of AT 2020wey / ZTF20acitpfz as a Tidal Disruption Event in a Post-Starburst Galaxy

Authors: Iair Arcavi (Tel Aviv U), Jamison Burke (Las Cumbres / UCSB), Irura Nyiha (MIT), and Matt Nicholl (Birmingham)

Source Group: [StarDestroyers](#)

Keywords: [TDE](#), [Time-domain](#), [Spectroscopy](#), [Transient](#), [Optical](#)

Abstract: We report the classification of AT 2020wey / ZTF20acitpfz as a Tidal Disruption Event

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We selected AT 2020wey / ZTF20acitpfz for classification based on its photometric properties, location in its host galaxy, and its host galaxy properties, by using the [Lasair](#) ([Smith et al. 2019](#)) [23TDE-candidates](#) alert stream created by M. Nicholl, combined with the "E+A Galaxies" watchlist, which lists the pre-selected likely TDE host galaxies from [French & Zabludoff 2018](#) (there is now a Lasair alert stream which combines all of these selection criteria: [23TDE-candidates-EA](#)).

We obtained a spectrum with the Floyds spectroraph mounted on the Las Cumbres 2-meter Faulkes Telescope North in Haleakala, Hawaii, on 2020-10-22 13:20:16 UT as part of the StarDestroyers program (PI: I. Arcavi). The spectrum, which we make publicly available on the TNS, displays a strong broad emission feature consistent with He II 4686A, and possible broad H $\alpha$  emission on top of a blue continuum. As such it is likely a new member of the "TDE H+He" class ([van Velzen et al. 2020](#)).

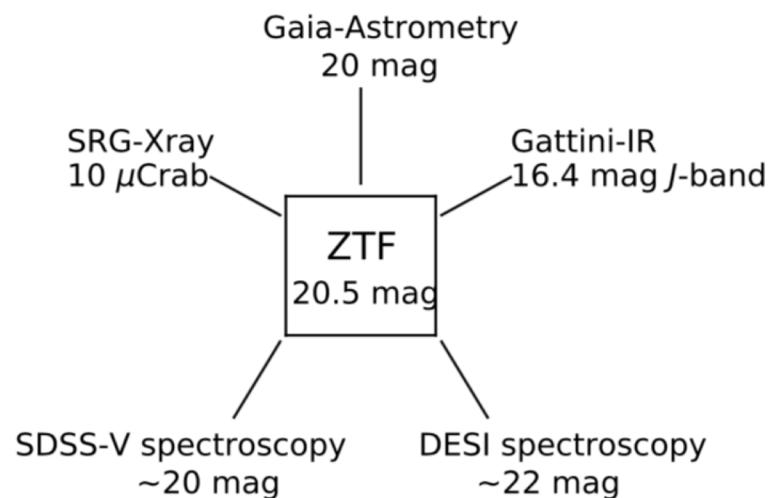
The [ZTF public light curve, as retrieved from Lasair](#), indicates that the event may be pre-peak. Swift observations have been requested, and ground-based optical followup is planned using the Las Cumbres Observatory Network.

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ZTF Phase-I (Mar 2018 — Sep 2020)

ZTF Phase-II (Oct 2020 — Sep 2023)



Class	Rate (yr <sup>-1</sup> )	Notes
SN Ia (<18.5)	1200	Redshift Completeness Factor
SN Ia ( $z < 0.1$ )	2900	Peculiar velocities
Infant SN II	100	Flash spectroscopy
Infant Ia	400	Progenitor Study
<200 Mpc SNe	700	Demographics
SLSN	78	Demographics
TDE	20	Demographics

