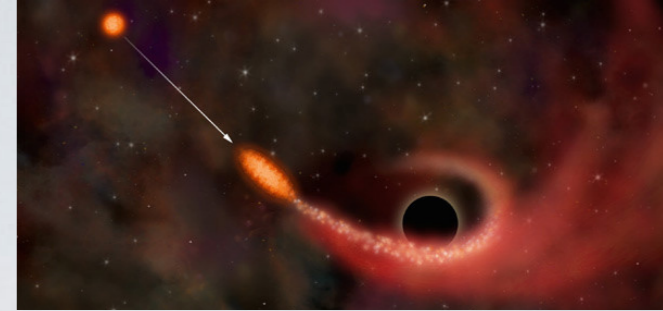# Using Data Lab to Identify Tidal Disruption Events
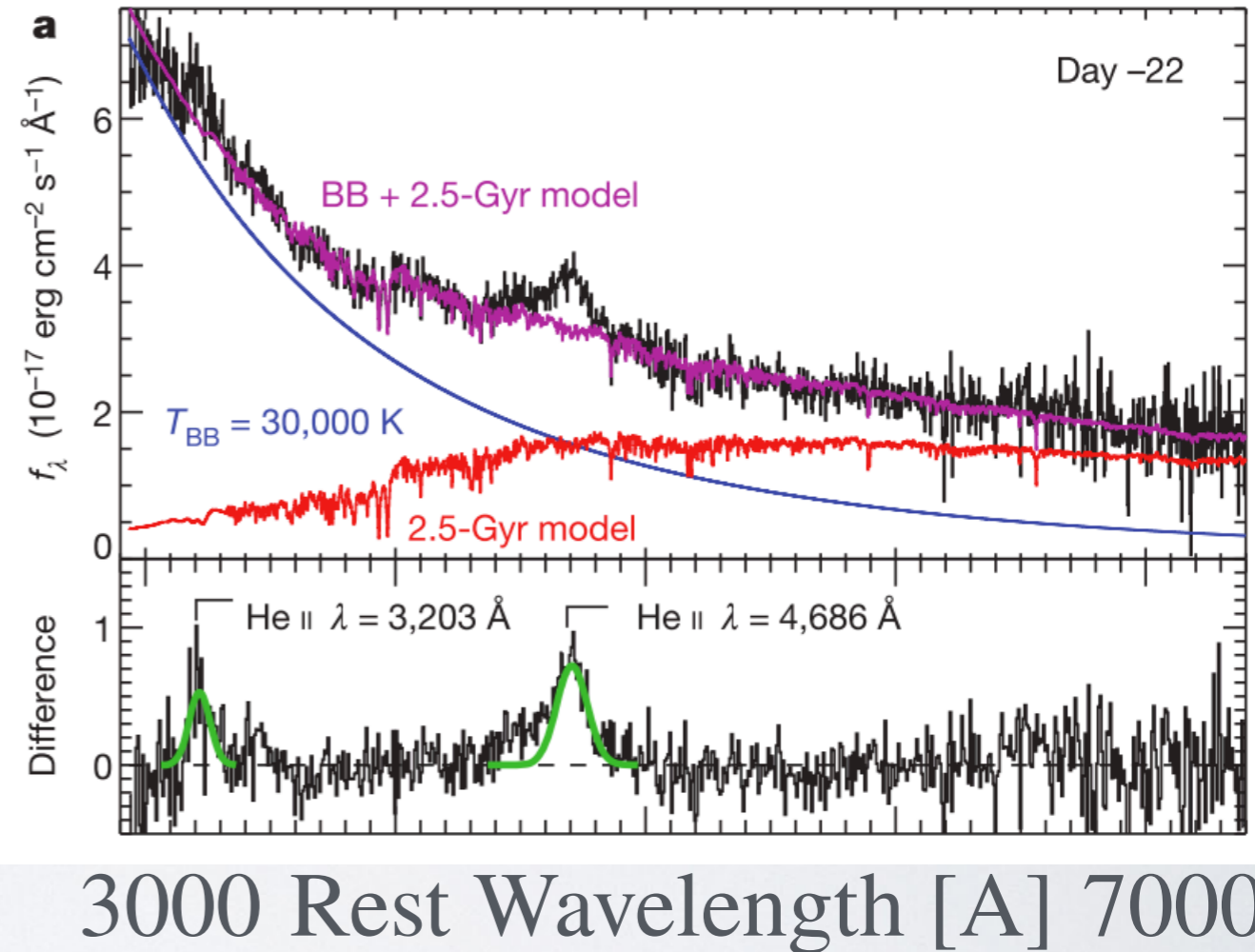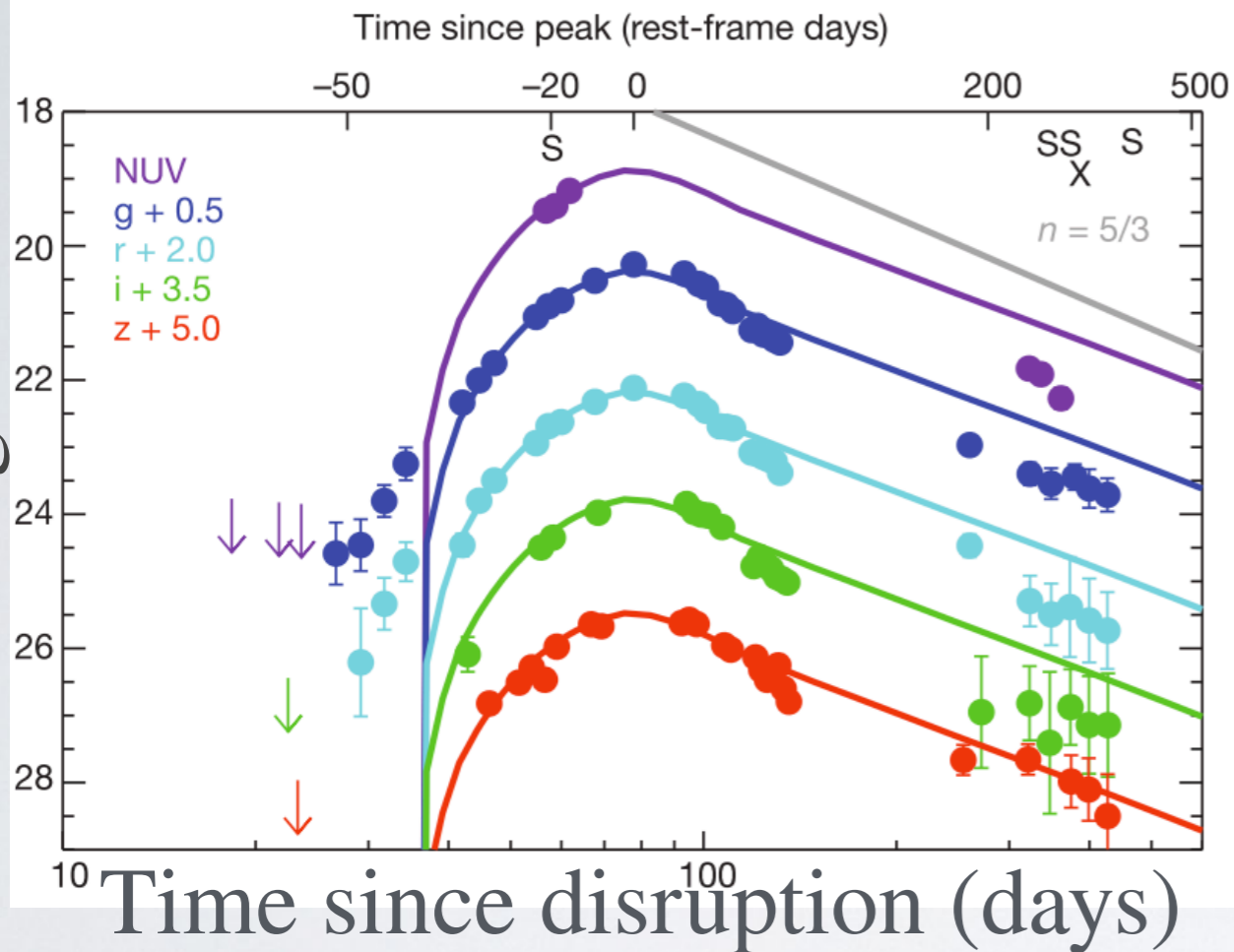

NASA/CXC/M.Weiss
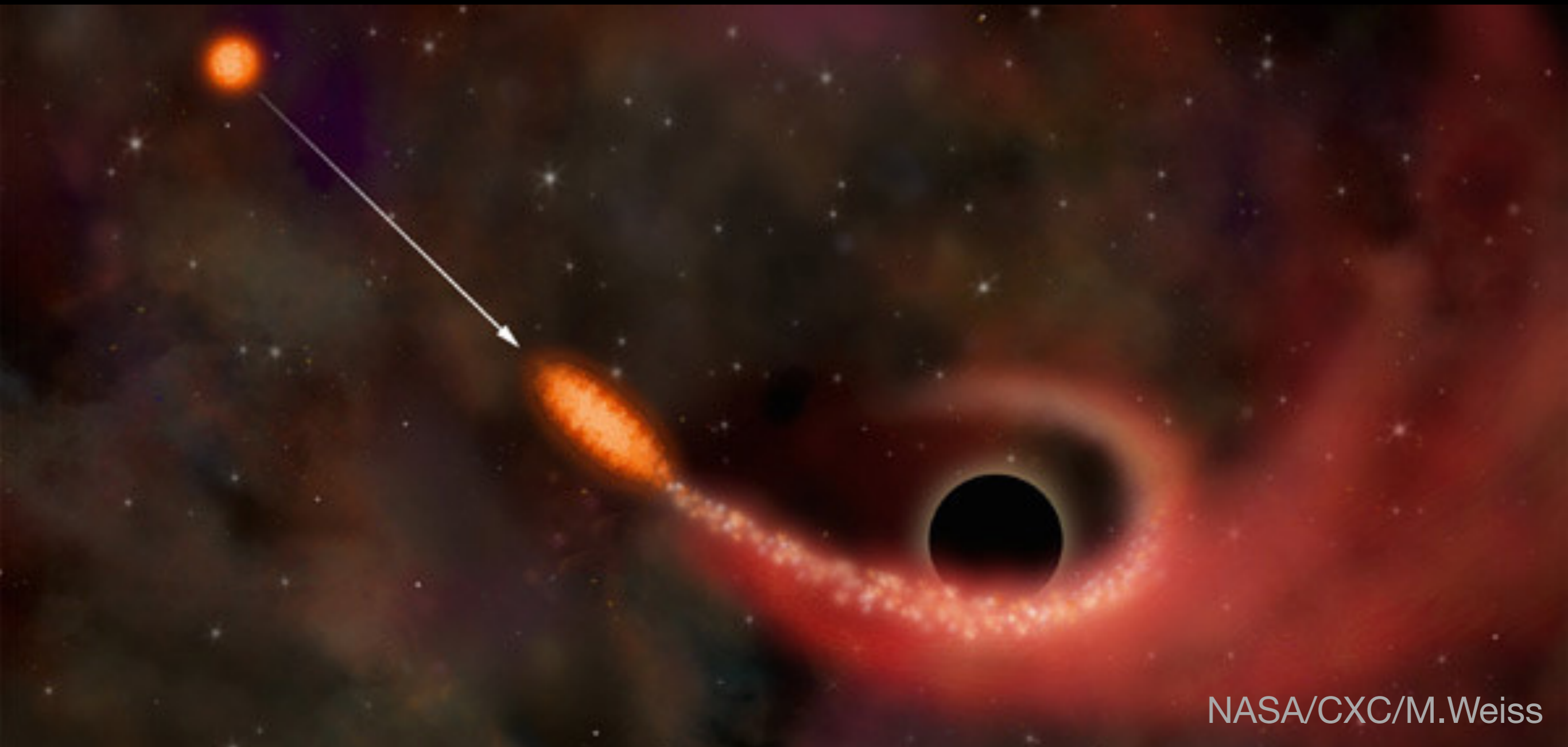
K. Decker French

University of Illinois Urbana-Champaign

Tidal Disruption Events (TDEs)

PS1-10jh, Gezari+ 2012

- Stars which travel closer than the tidal radius of a black hole are disrupted

- If this occurs outside the event horizon (if $M_{BH} < 10^8\,M_\odot$), observable flare

- Many are UV/optical bright

- Class w/ broad H/He emission lines

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TDE rate enhanced in post-starburst galaxies
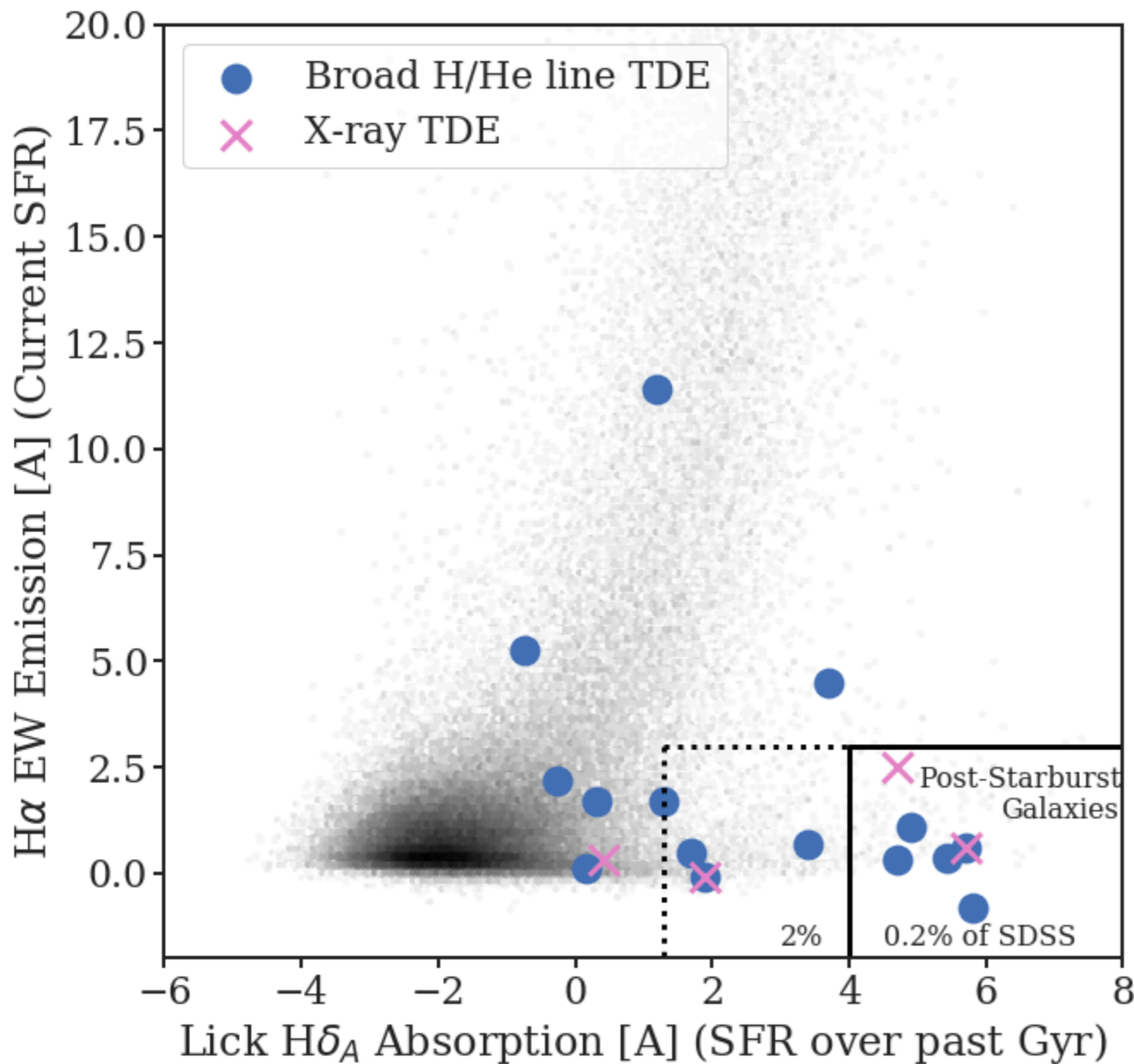
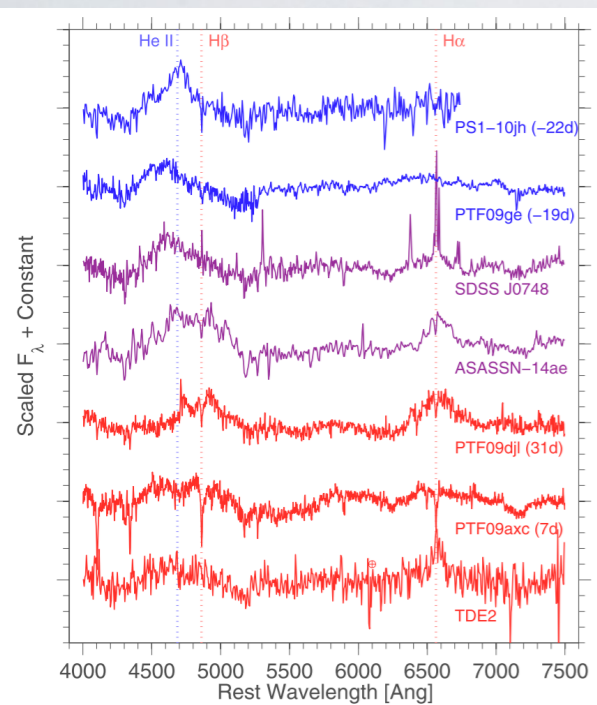- ~Half of all TDEs in quiescent Balmer-strong galaxies

- TDE rate enhanced by ~20-50x in post-starburst & QBS galaxies

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French+ 2016; 2020b

The Future of TDE Discovery

**Until 2019
~2 TDEs/yr**

Arcavi+ 2014

2019-2023: ~20-30 TDEs/yr

ZWICKY TRANSIENT FACILITY

**YSE
Young Supernova Experiment**

ATLAS

ASAS-SN

**2023: >4000
TDEs/yr
van Velzen+11**

LSST Large Synoptic Survey Telescope

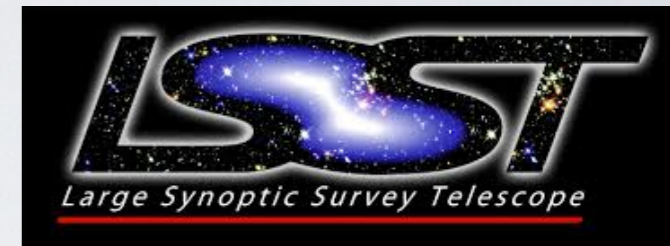**Vera Rubin Observatory**
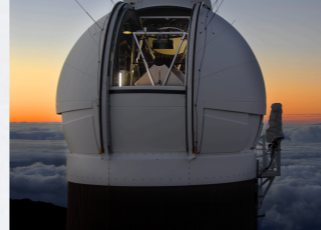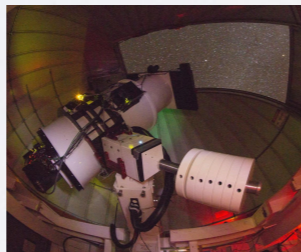
- Follow-up spectroscopy and multi-wavelength obs needed

- Host galaxy preference can help identify early-time and/or unusual TDEs.

  Host obs limited in southern hemisphere, need to train a model on

  photometry only

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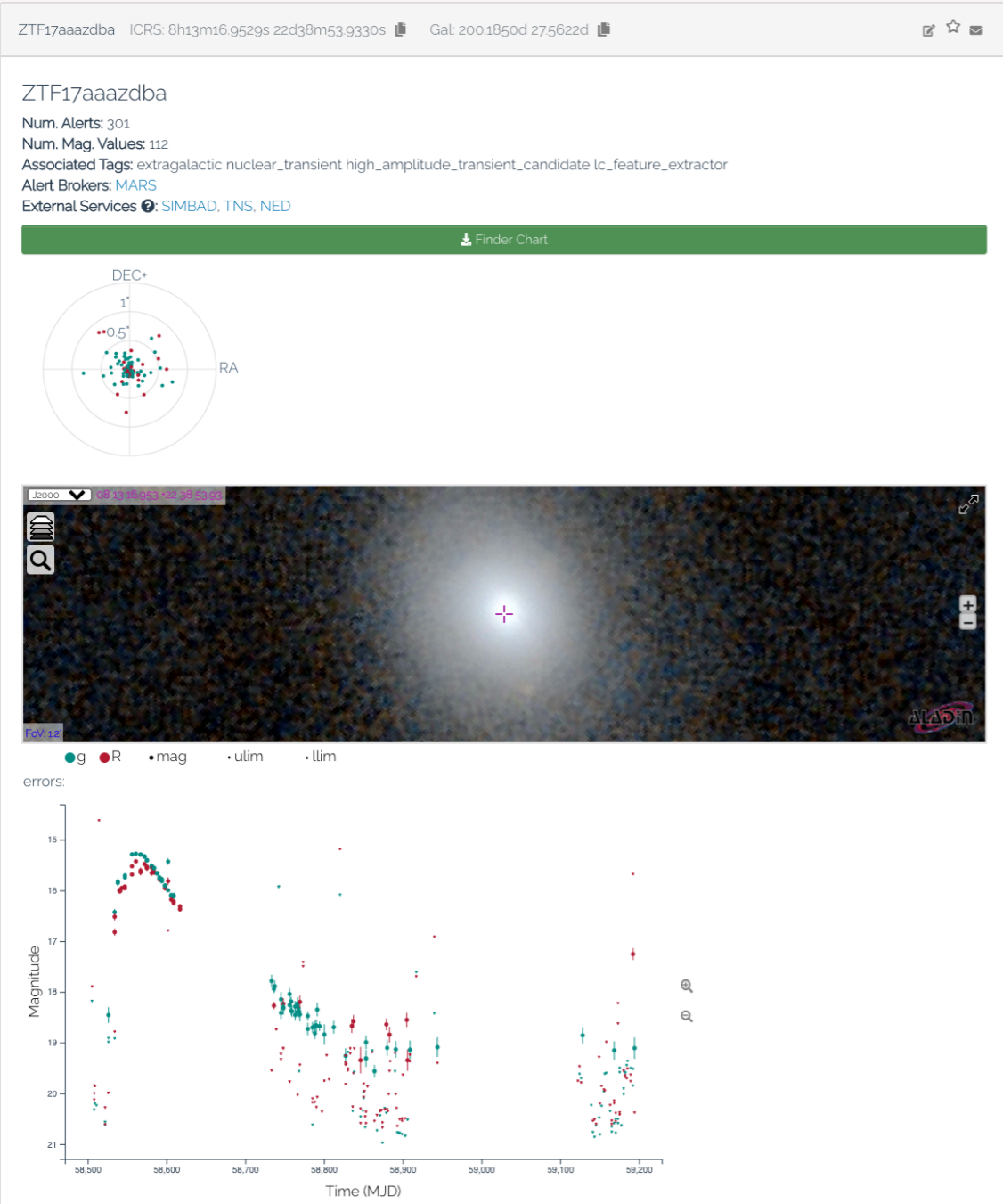
Using the Host Galaxy Information to find TDEs

1. Assemble UV-Optical-IR photometry for all available galaxies - Data Lab provides a convenient way to assemble and cross-match
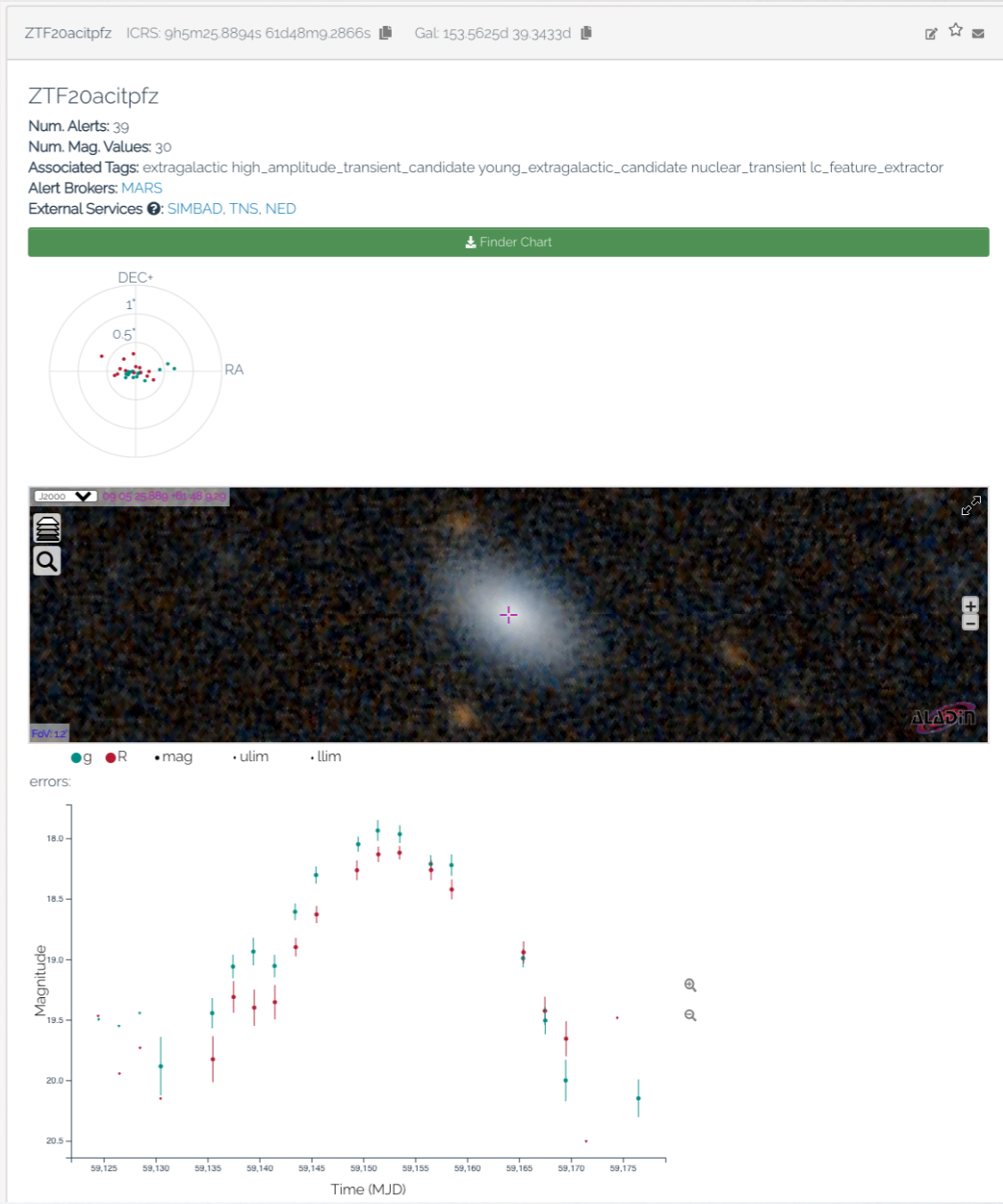
2. Train ML model on known galaxies and apply to new ones

3. Use ANTARES to find transient events in table of likely TDE host galaxies

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ANTARES view of two recent TDEs in post-starburst galaxies from ZTF

AT2019azh, Hinkle+2021

AT2020wey, Arcavi+2020

Decker French (University of Illinois)