

High Energy Astrophysics with Exoplanet Satellites: AGN and Blazars

Krista Lynne Smith

**KIPAC @ SLAC, Stanford
University**

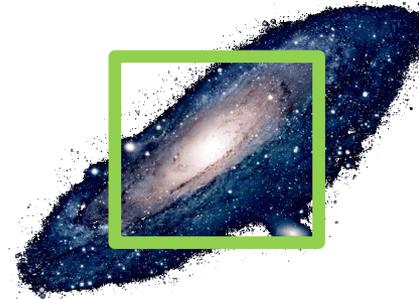
Einstein Fellows Symposium
October 3, 2018

Kepler data are optimized for different applications, and are dangerous for accretion physics

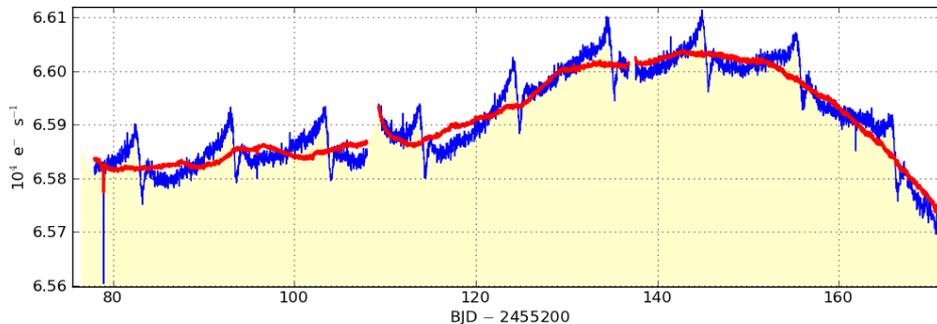
1.

Systematics Mitigation: A Necessary Evil

Kepler: Not Built for AGN...



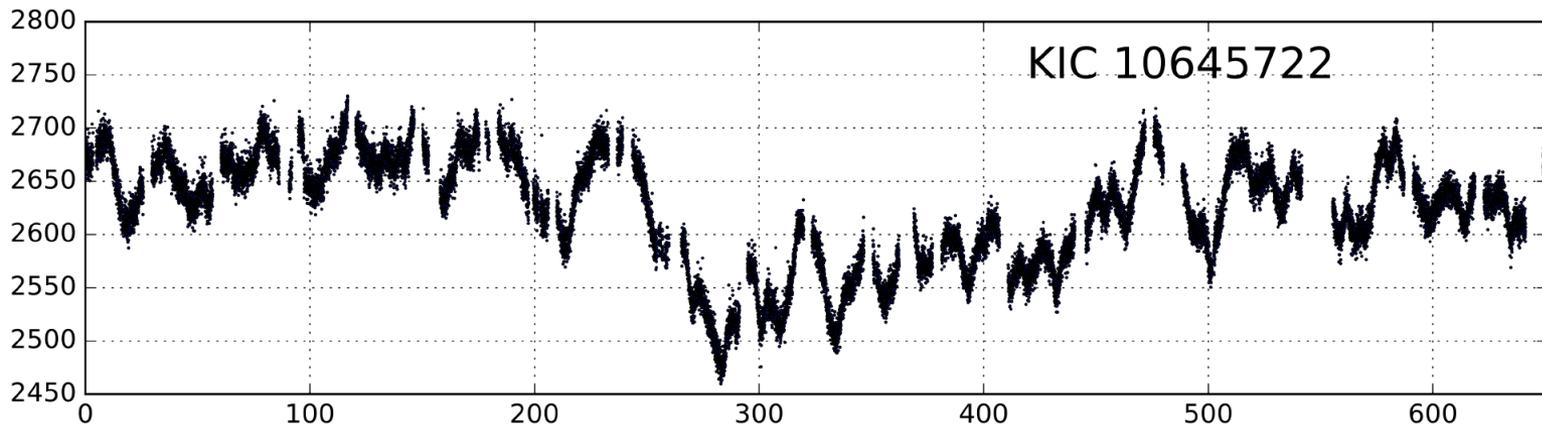
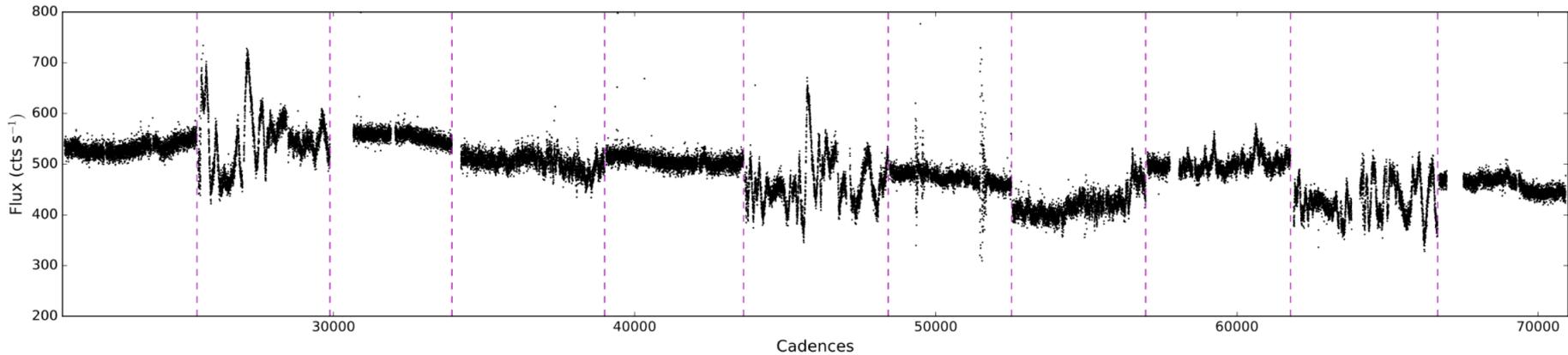
Small windows to make light curves work fine for stars, but not for objects with host galaxies.



Automatic removal of non-periodic trends eliminates the real variability signal.

Kepler: Not Built for AGN...

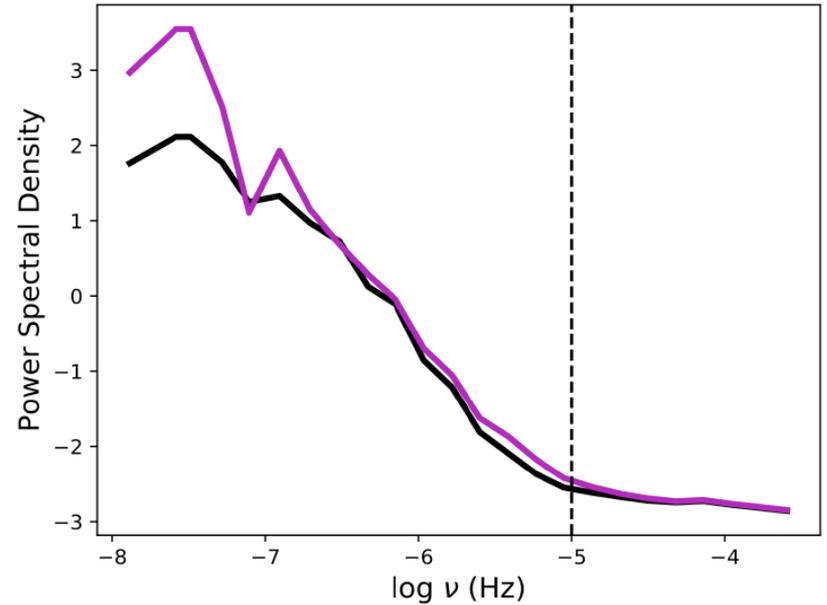
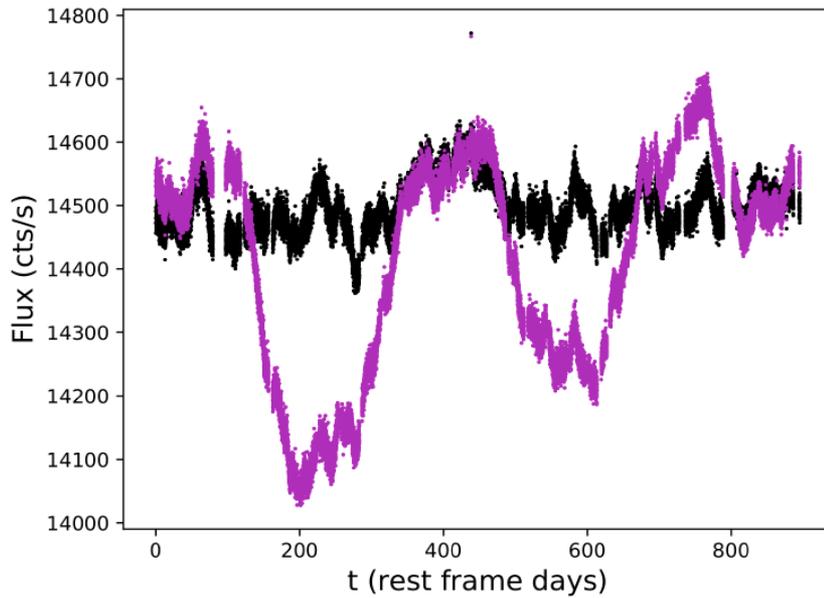
Moire pattern drift noise imitates stochastic



Light Curves and PSDs: Before and After



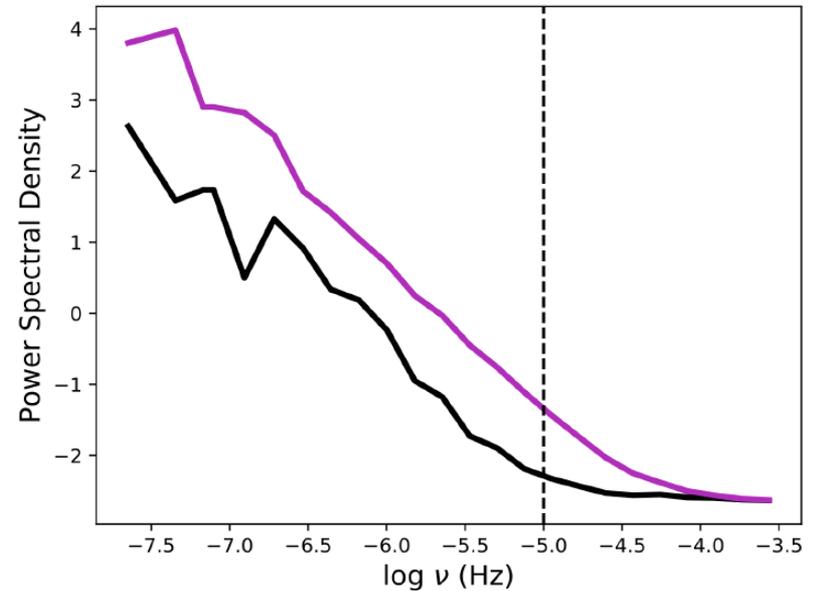
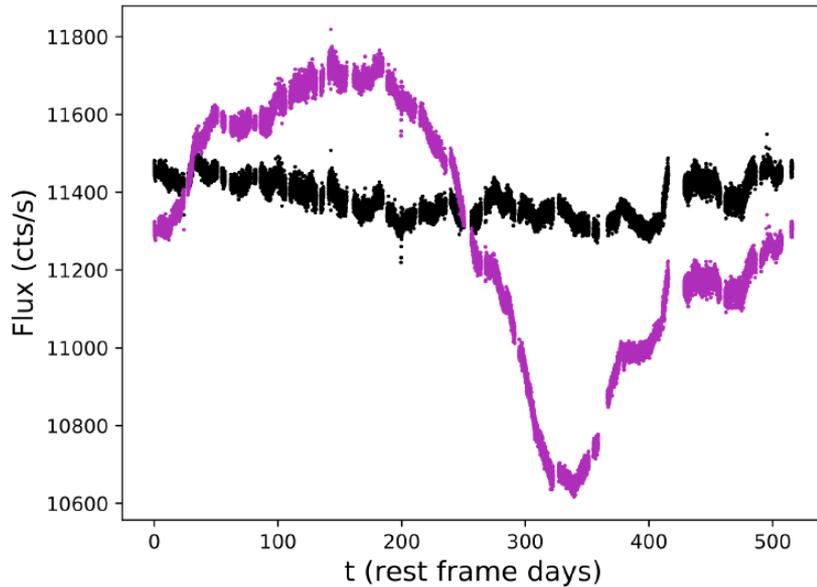
KIC 2694186



Light Curves and PSDs: Before and After



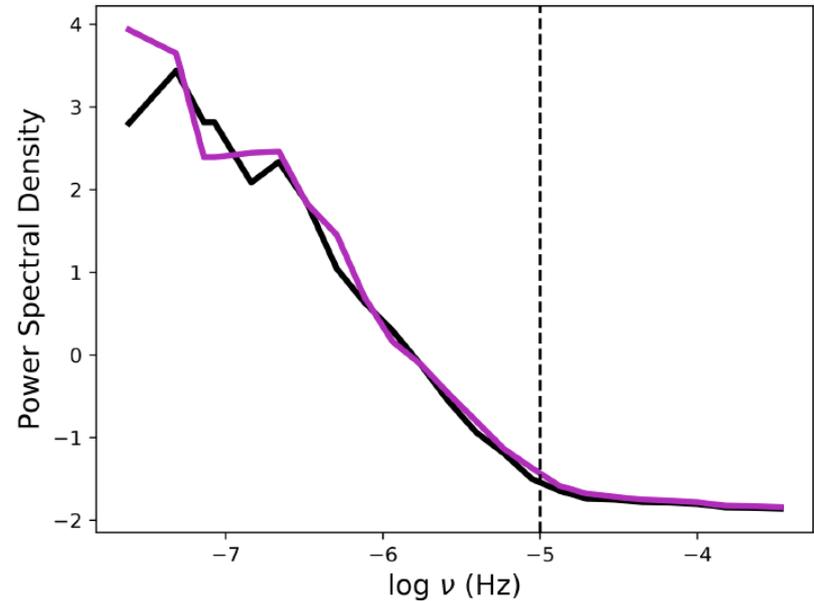
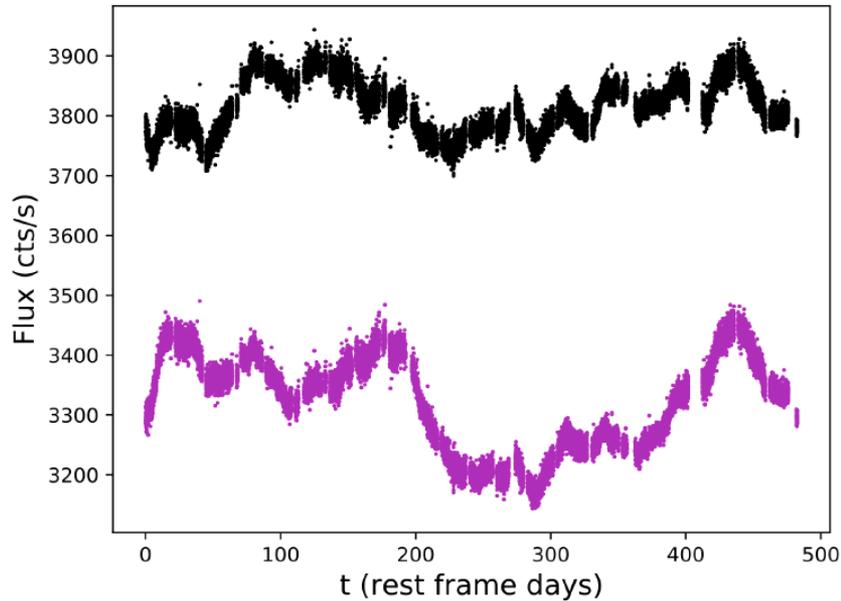
KIC 3347632



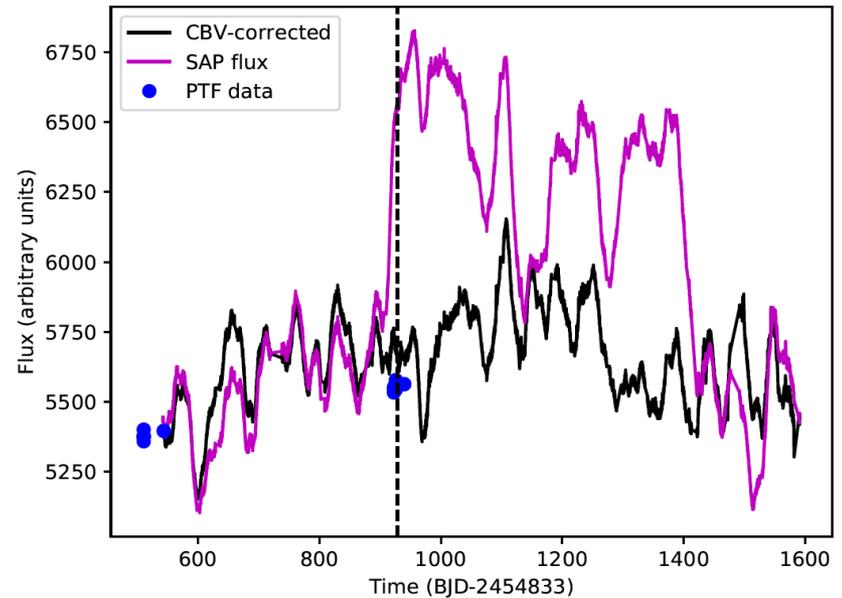
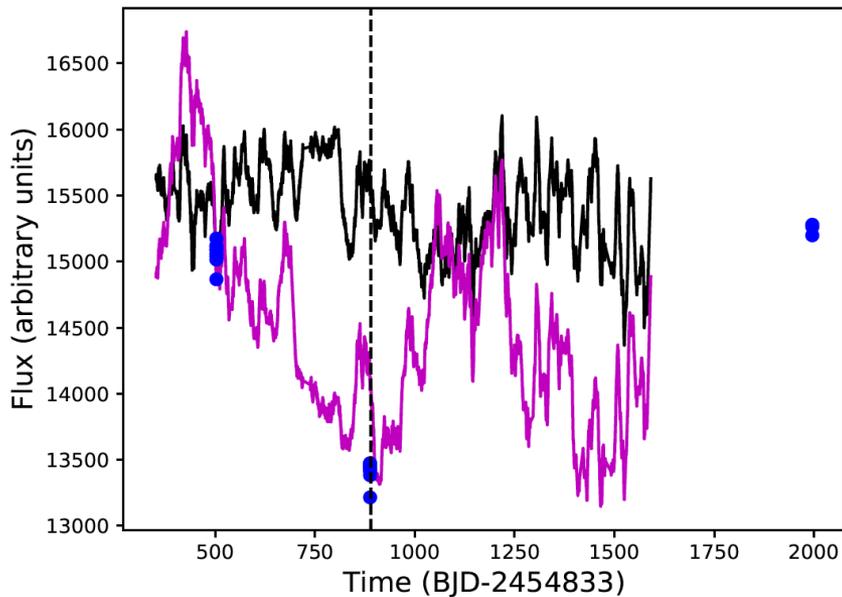
Light Curves and PSDs: Before and After



KIC 7610713

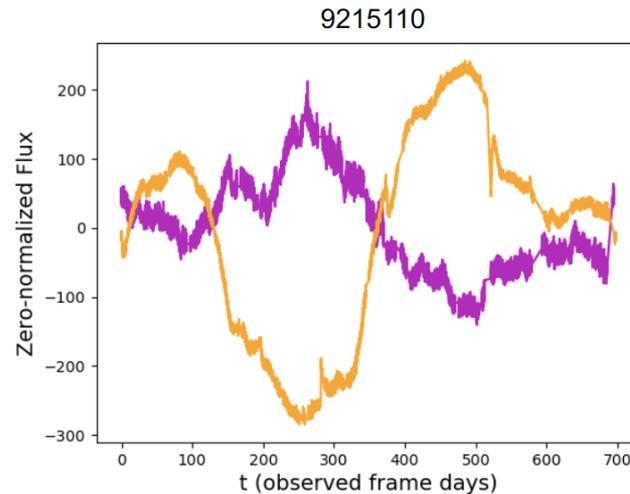
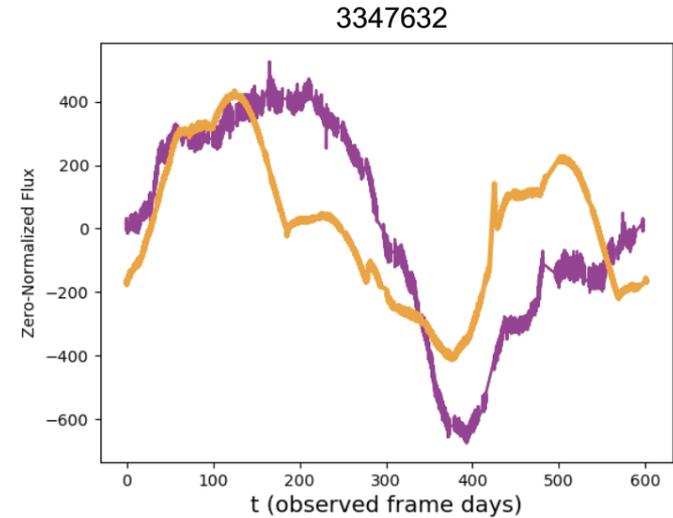
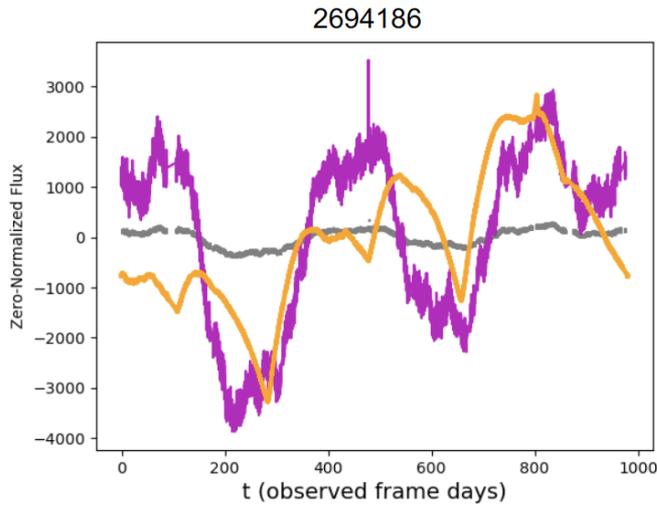


Correction Check: Ground-based Anchors



Unfortunately this was not being done during Kepler's run...important lesson moving forward.

Correction Check: Compare to Stars

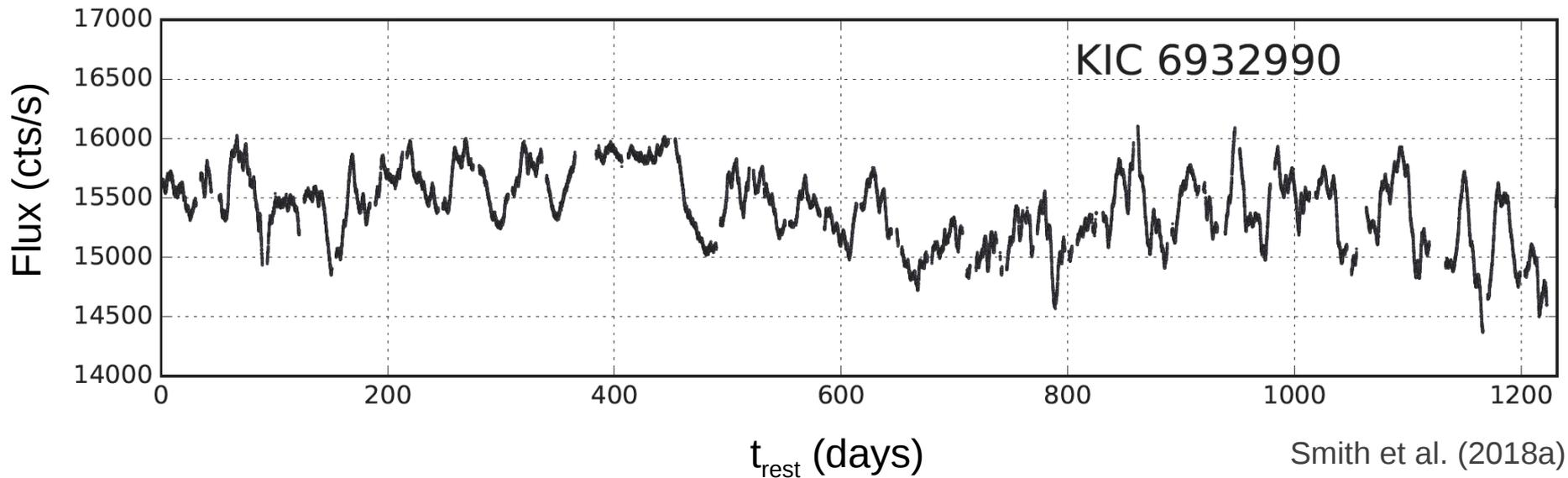


*Space-based
optical AGN light
curves enable
discoveries not
possible from the
ground.*

2.

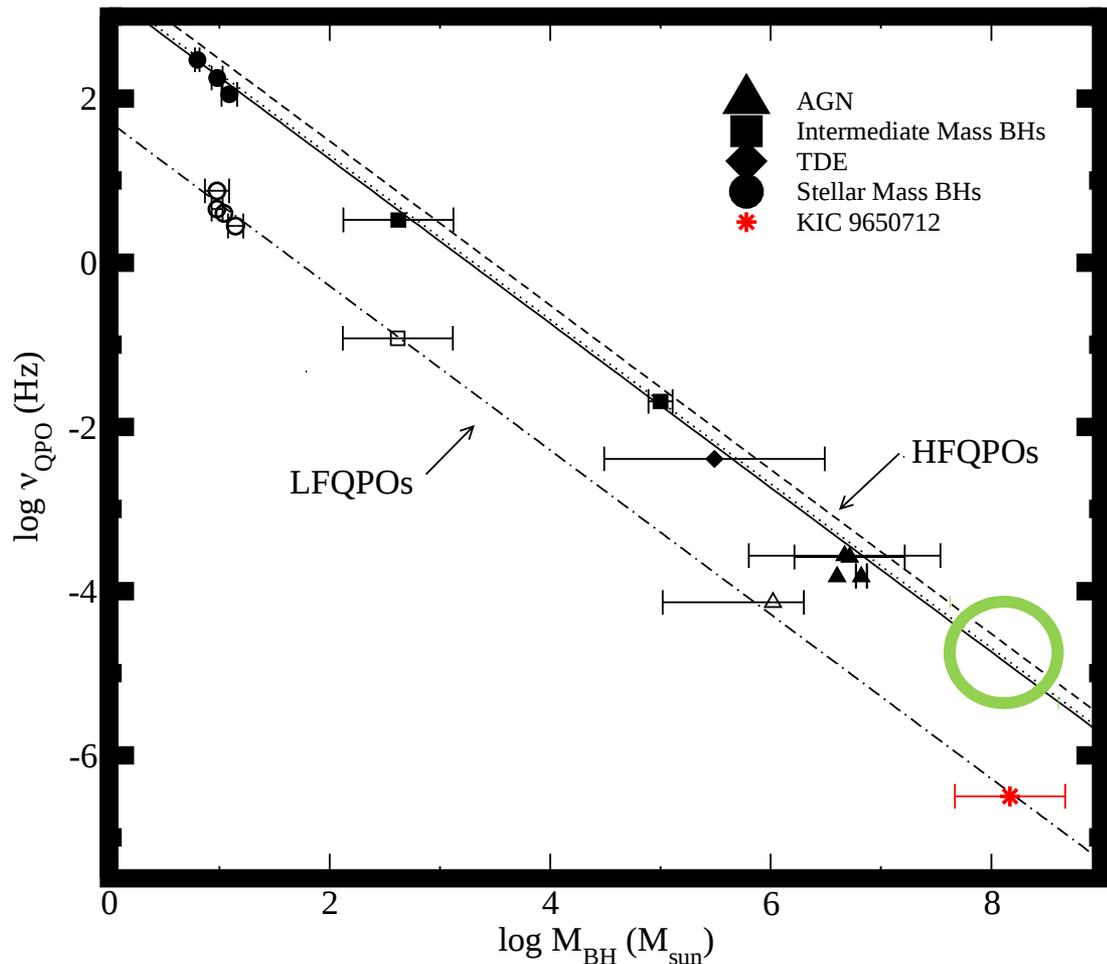
New Timing Results: Brief Overview

Worth it!



Months-years of monitoring with 30 minute cadence.

Optical Quasi-Period in an AGN



Smith et al. (2018b)

- Largest black hole mass in any QPO
- Only optical QPO in AGN
- Looking for counterpart with NICER, XMM
- Rare precise mass probe if we can find more optical QPOs.

*What to expect
from the new
space-based
exoplanet hunter*

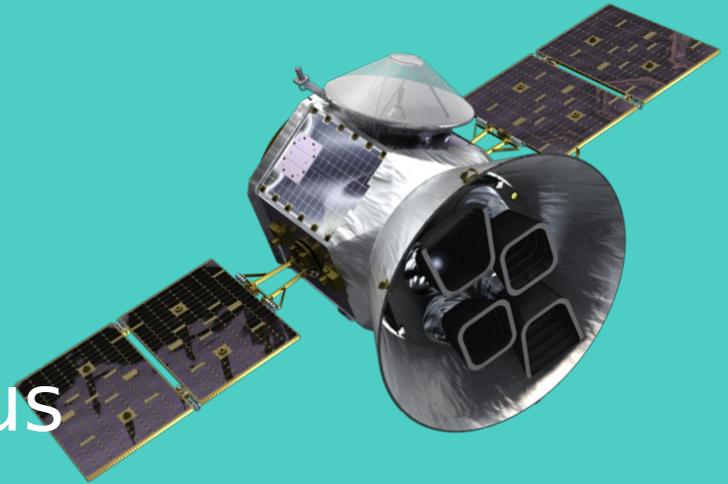
3.

TESS



Transiting Exoplanet Survey Satellite

- Photometric Precision
- High cadence, continuous sampling
- Long baselines*

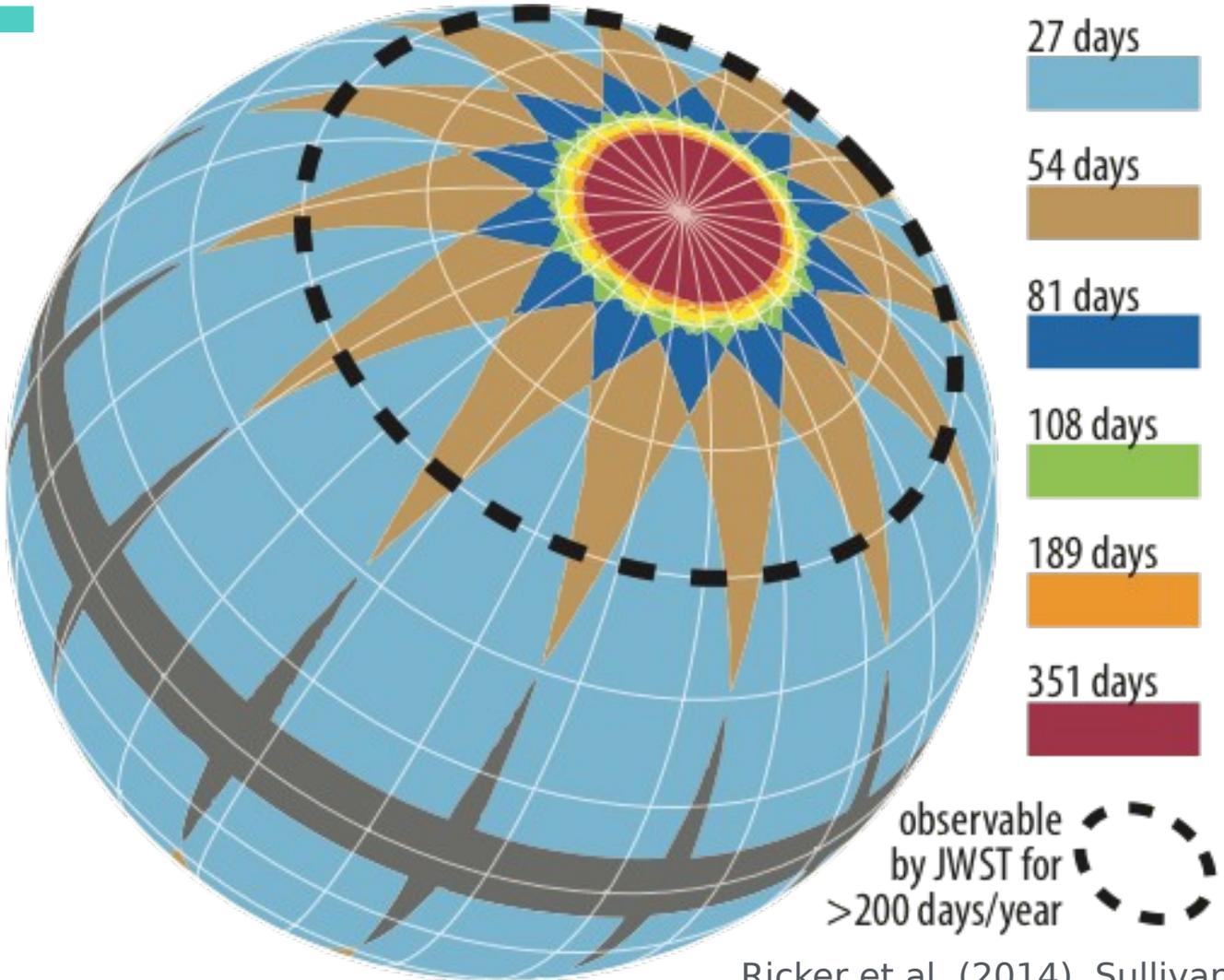


*depending on sky position

TESS: Overview

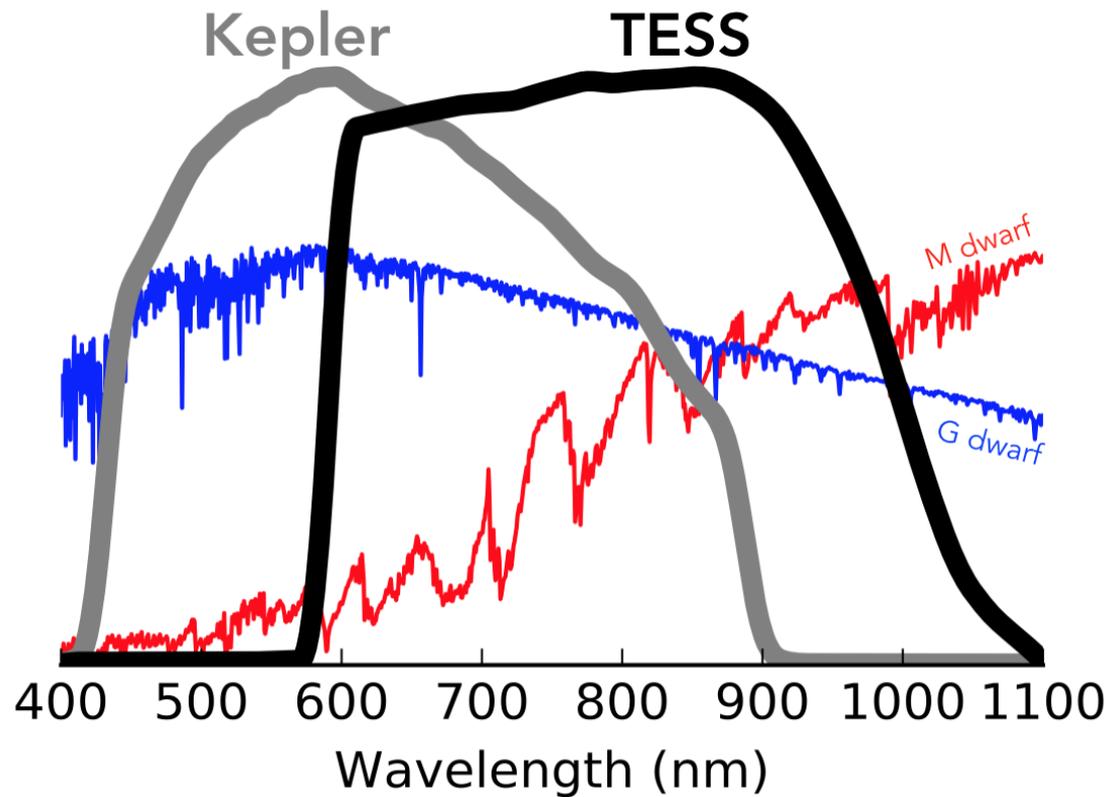
- High Cadence!
 - 2 minute short cadence (proposal)
 - 30 minute long cadence (for anyone!)
- Important differences from Kepler
 - Redder than *Kepler*/K2
 - Higher-z targets, but perhaps brighter limiting magnitude
 - Larger pixels – more difficult in crowded fields
- Baselines range from 27 to 351 days
- Nearly all-sky coverage!

TESS: Sky Coverage



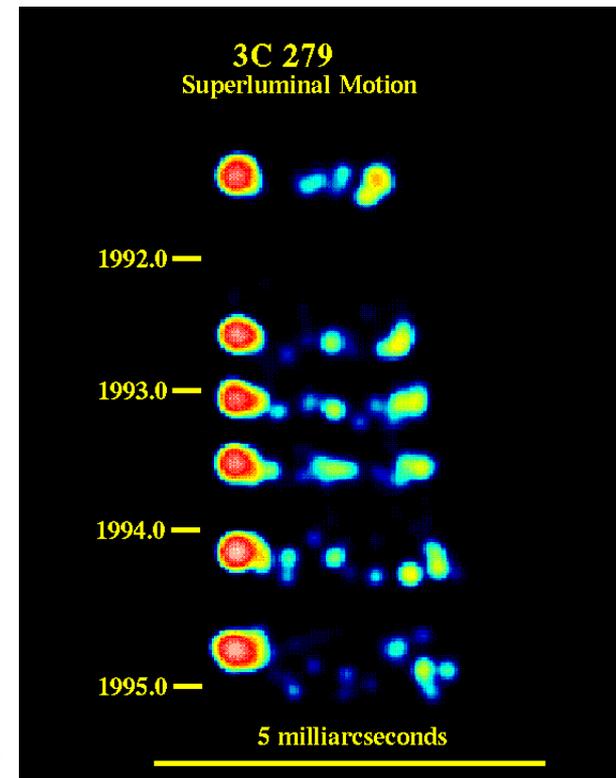
Ricker et al. (2014), Sullivan et al. (2015)

TESS: Photometry and Bandpass



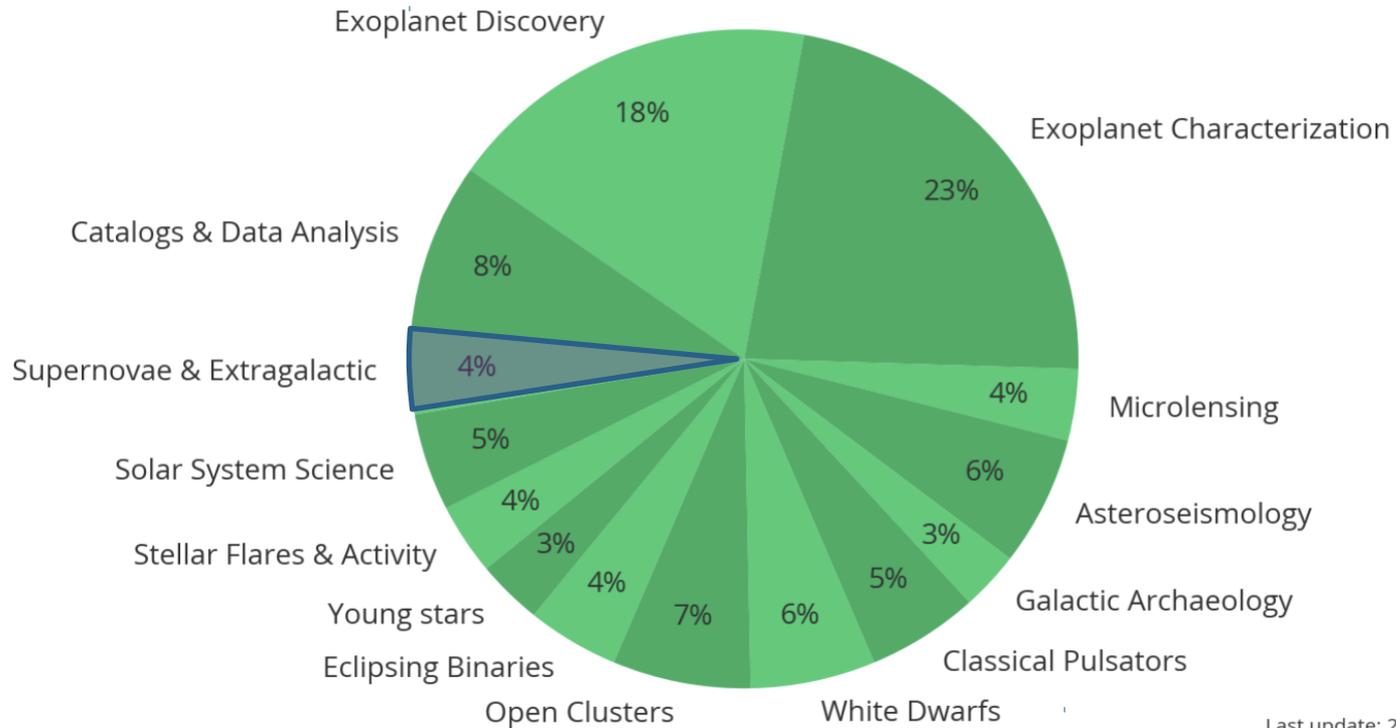
TESS and the *Fermi* Blazars

- Four blazars in each TESS polar zone: 351 days with 30 min monitoring
- *Swift* monitoring every 3 days
- *Fermi* monitoring every 3 hours
- Korean VLBI radio spatial/temporal monitoring (cadence undecided)



Wehrle et al. (2001)

NASA #K2Mission Papers by Science Topic

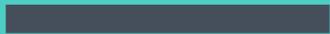


Last update: 2017 Oct 12

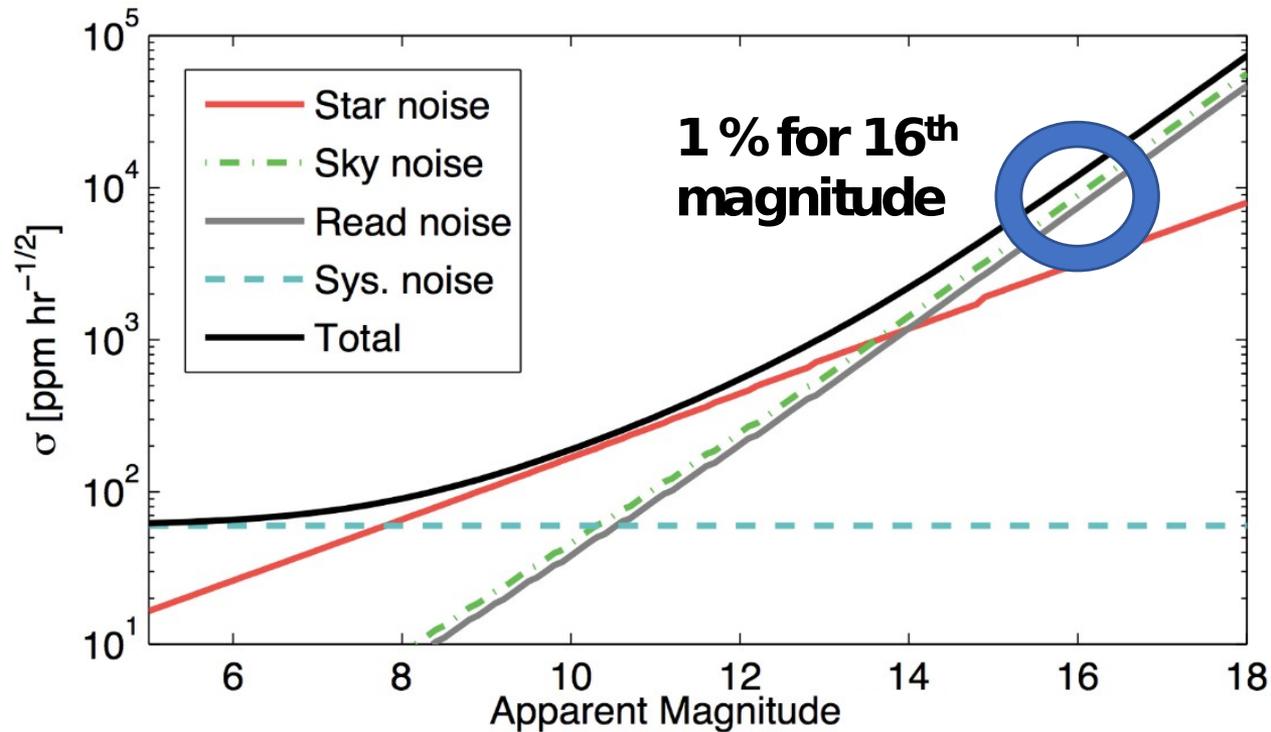
Thanks



Any questions?



TESS: Photometry and Bandpass



...but let's wait and see.

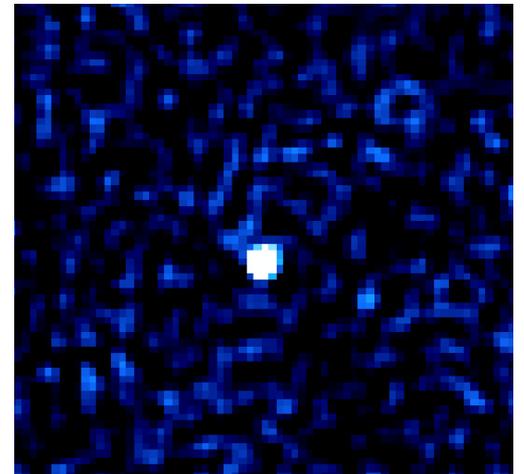
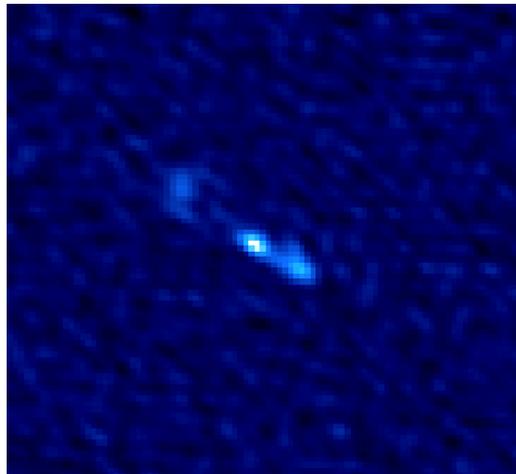
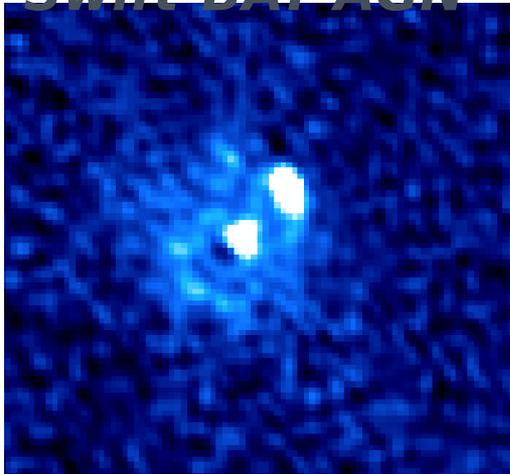
*High-resolution
radio imaging of
star formation and
jets in an X-ray
selected AGN
sample*

4.

AGN Feedback and the VLA

The JVLA-BASS Survey

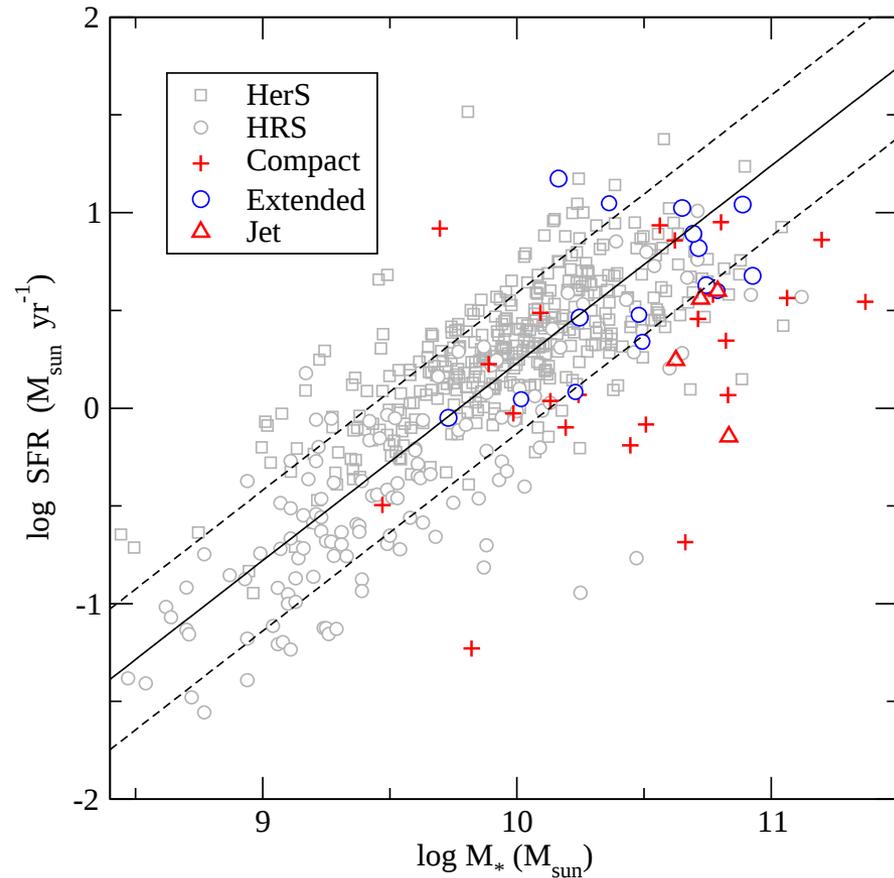
***1" resolution 22 GHz imaging of 100 radio-quiet
Swift-BAT AGN***



***Star formation, mini-jets, and unresolved
morphologies.***

Ongoing AGN Feedback in RQ AGN

*Summer 2016:
Are even mini-jets
able to suppress
host-wide star
formation?*



Ongoing AGN Feedback in RQ AGN

Summer 2018:
It sure looks that
way!

