



OU & APO



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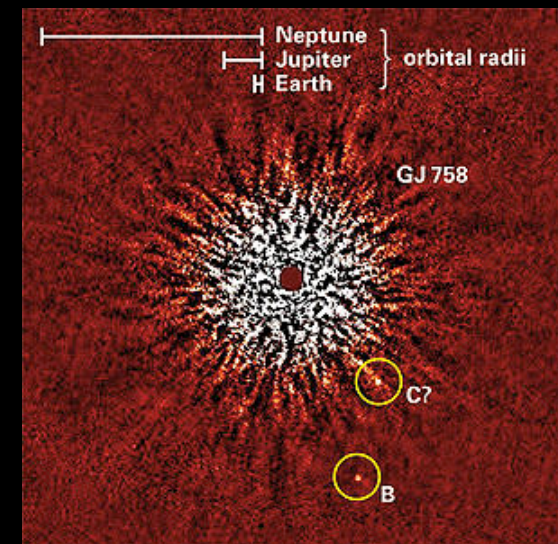
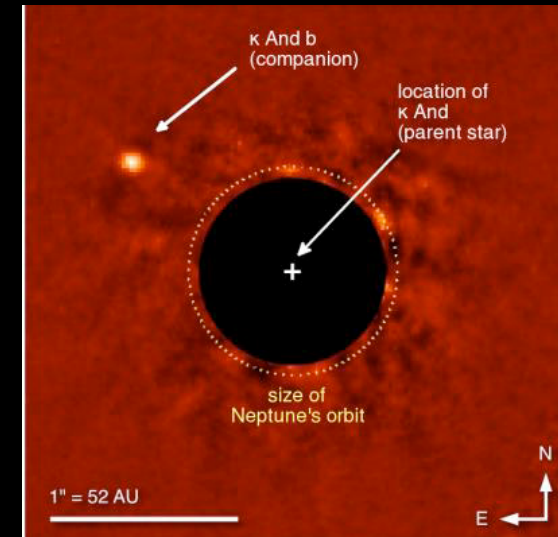
APO 20<sup>th</sup> Anniversary

# What Makes APO Special?

- People
  - Strong leaders
  - Professional & knowledgeable TOs
  - Professional & knowledgeable staff
  - Professional & knowledgeable colleagues at member institutes
- Instrumentation suite
  - Especially ability for intra-night changes
- Operations
  - Stable, user-friendly remote obs software
  - Flexible scheduling

# Science Highlights: Exoplanets

- SEEDS (echelle)
  - Fundamental stellar parameters of host (B9) star to kappa And b
  - Likely very low mass ( $\sim >10$  MJup) BD
  - Bonnefoy et al 2014, A&A, 562, 111
  - Age diagnostic for GJ 758 b,  $\sim 30$ -40 MJup BD
  - Janson et al 2011, ApJ, 728, 85
  - Age, activity, and fundamental stellar parameters for majority of SEEDS target sample
  - “Moving Group” 3-yr summary paper
    - Brandt et al 2014, ApJ, 786, 1
  - Full sample, OU grad Evan Rich et al. in prep

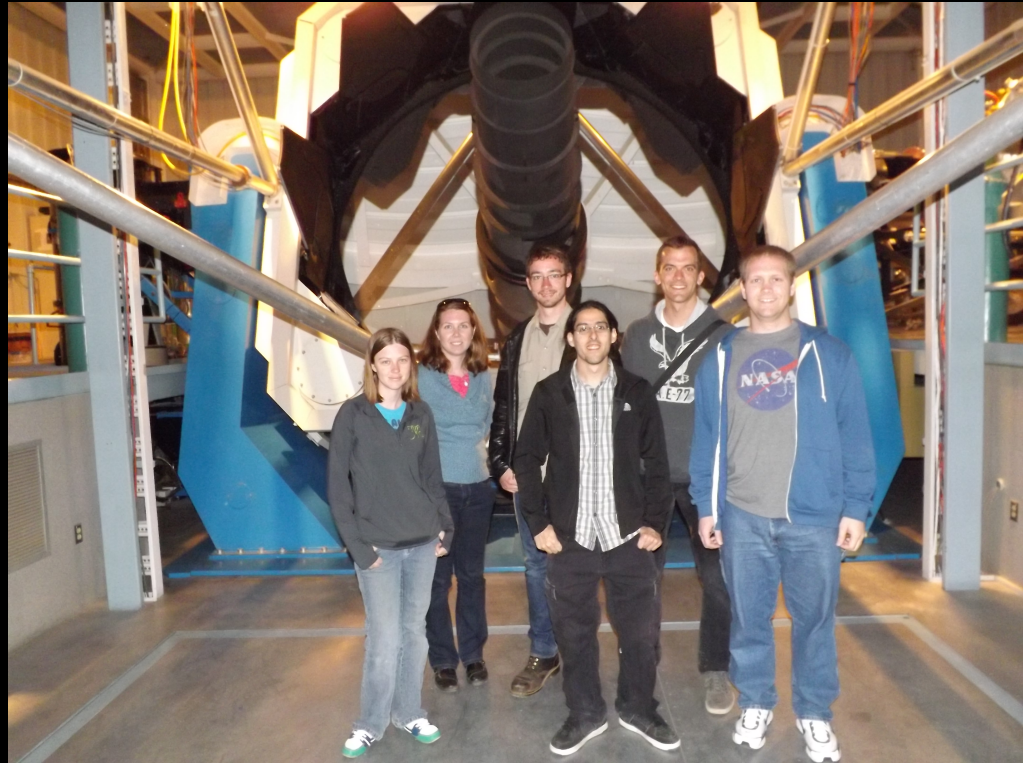


# Science Highlights: Exoplanets

- SDSS-III/MARVELS follow-up (echelle)
  - Constrain fundamental stellar parameters
  - RV confirmation of BD candidate(s)
  - 8 refereed papers
- SDSS-III/APOGEE follow-up (echelle)
  - RV confirmation & stellar activity measurements
  - Work in prep
- Implications of dM Flares on the Characterization of Exoplanets at IR Wavelengths (arcsat)
  - Flares on dM3e stars with energies that should occur 1x per 18 hr produce  $< 8.5$  mmag response in H
  - Flares on dM4.5e stars with energies that should occur 1x per 10 hr produce  $< 8.8$  mmag response in H
  - Tofflemire et al (2012) ApJ, 143, 12

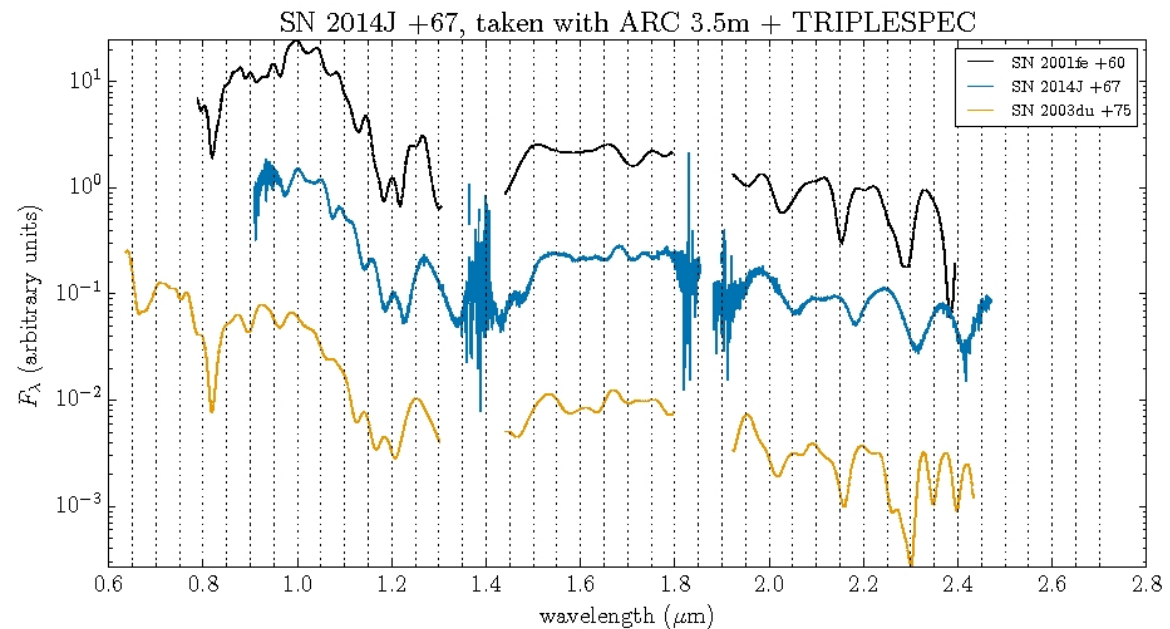
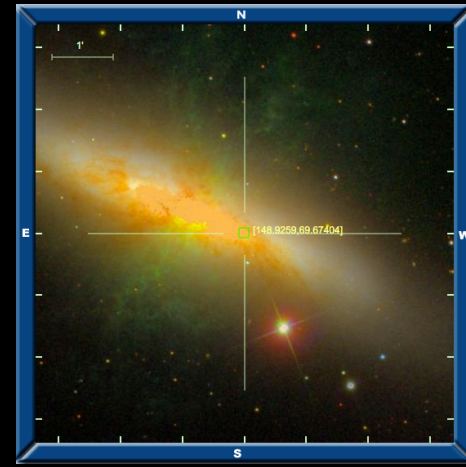
# OU & APO: Student Training

- OU: 7 astro faculty + 1 (2015; Nate Kaib) + 1 soon
  - 5 astro post-docs
  - 18 astro grads
- 2014-Q2 (3.5m+0.5m)
  - 6 students
- 2015
  - Obs techniques class
  - NHS (0.5m); OU-astro-101



# OU & APO: SN 2014J

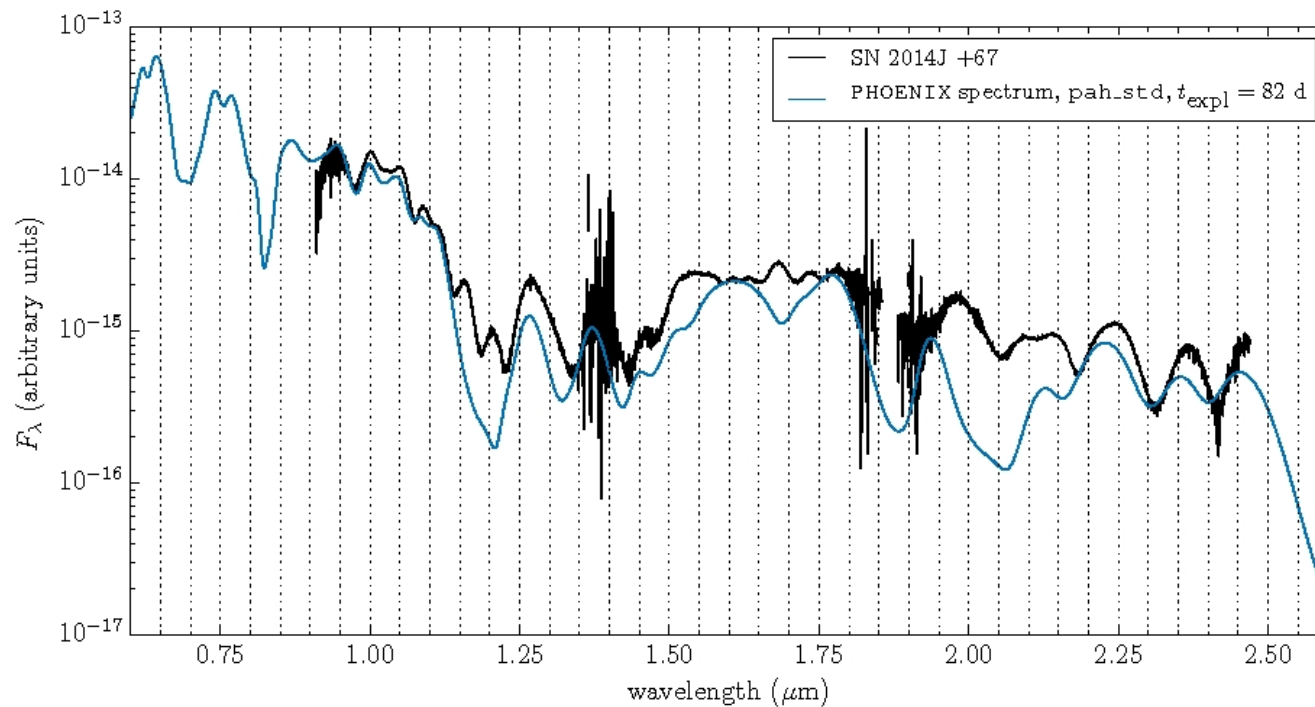
- M82 SN-Ia
  - Discovered mid-Jan 2014
  - Tspec obs April 8, 11 2014



Friesen et al 2014, in prep

# OU & APO: SN 2014J

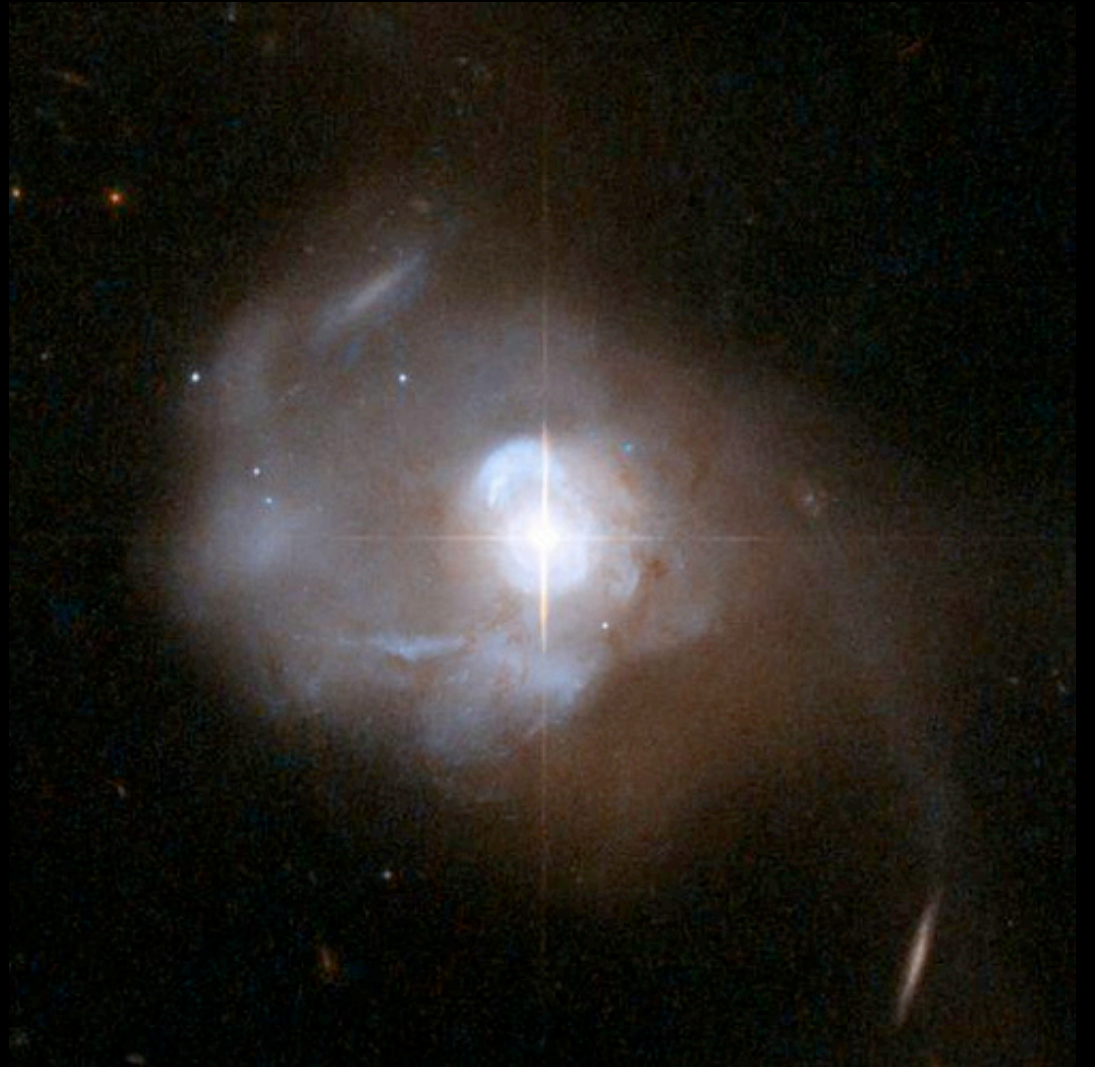
- Tspec epoch: transition from photospheric to nebular phase
  - Currently being modeled w/ PHOENIX code
  - Most features reproduced by permitted lines of Fe II, Co II, Ni II, Mn II, Ca II (& 1 [Ni II] line)





# Mrk 231

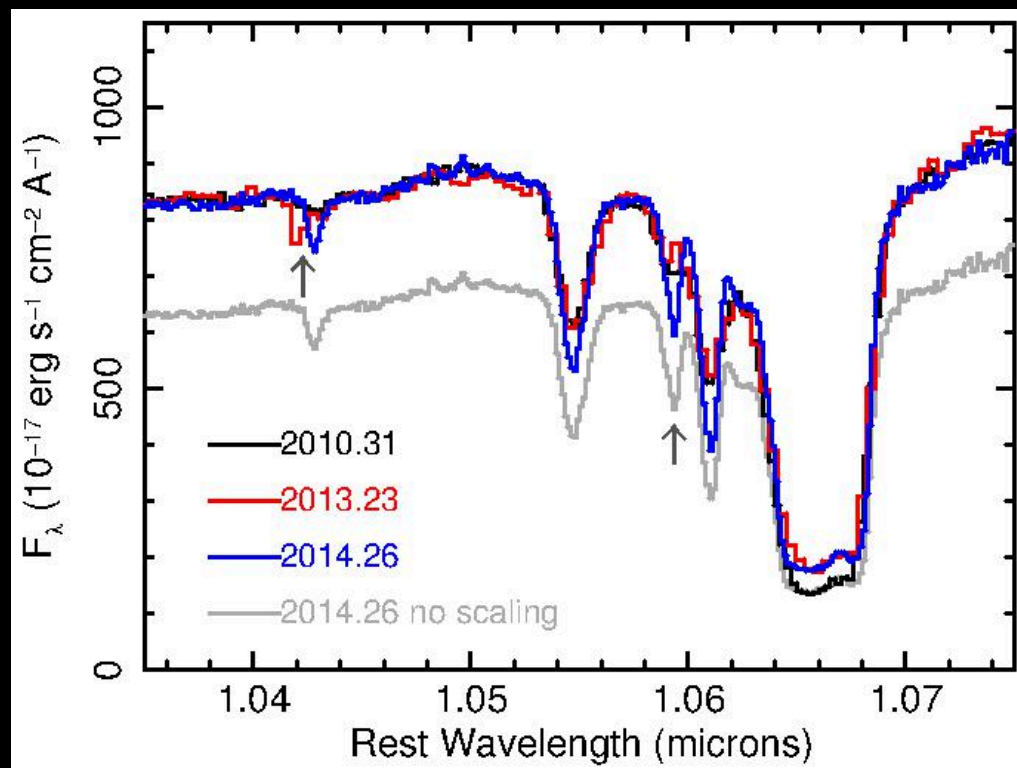
- A famous, nearby ( $z=0.0421$ ) ultraluminous infrared galaxy
- Nuclear starburst
- Galactic outflow
- ***Unique NaID broad absorption line***





# Discovery of HeI\* Broad Line in Mrk 231

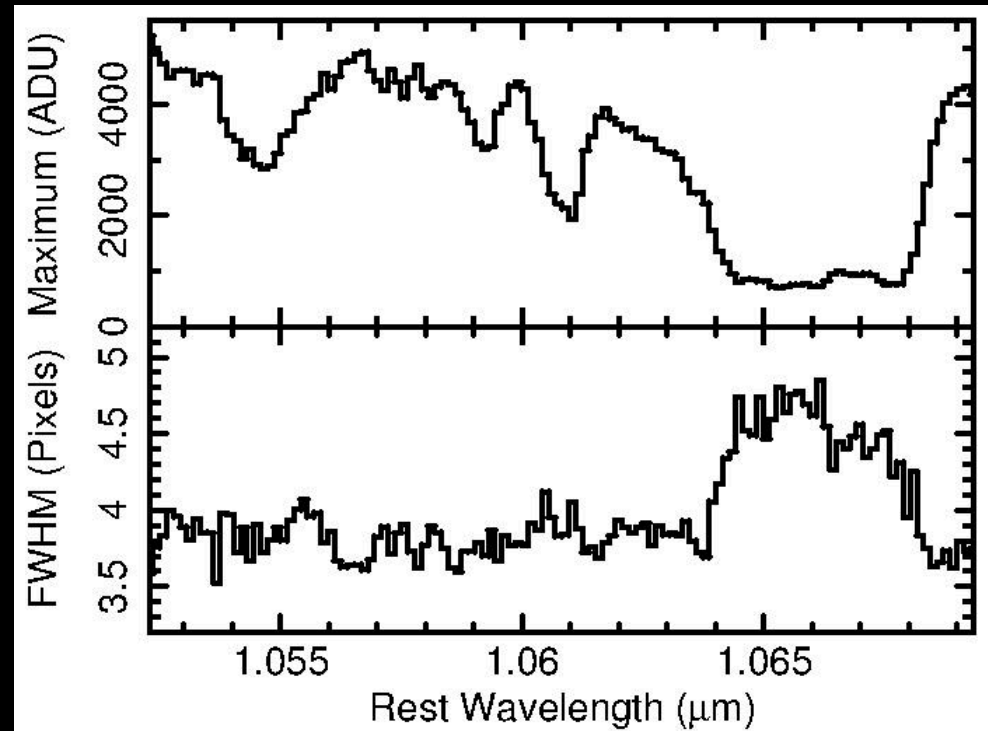
- Leighly et al. 2014 discovered a HeI\* Broad Line in 2010 IRTF data
- 2013 MDM data revealed tentative evidence for a *new* high-velocity component ( $\sim 11,000$  km/s)
- **2014 APO TripleSpec observation confirmed high velocity component.**



- TripleSpec resolution revealed additional component at **6,620 km/s.**

# Origin of Trough Fill-in

- HeI\*10830 trough is not black, but is probably saturated. What is the origin of the fill in?
- Analysis of high SNR spectral trace *revealed resolved emission in the trough*, implying host galaxy fill in.



# Summary

- OU is using the 3.5 + 0.5m for
  - Variety of science: exoplanets, circumstellar disks, SN, pulsating WDs, quasars
  - Student (grad+ugrad) training
    - 0.5m additionally for EPO and class labs
- We hope to continue + expand our relationship with ARC in the future

# More NaI Absorption Line Quasars?

- Leighly et al. 2014 showed that the NaI absorption in Mrk 231 plausibly occurs in an interaction, along our line of sight, between the quasar wind and effluent from the nuclear starburst.
- *Is this interaction rare?* Only 4 quasars with NaI absorption are known.
- Or is NaI (5890, 5896Å) usually *redshifted into the infrared?*

# Search for Broad Na I Absorption in BALQSOs

- First target: SDSS J0300+0048
- Overlapping trough quasar with FeII, MgII, CaII absorption
- Observed using APO TripleSpec Jan 27, 2014
- ***No evidence for NaI absorption***

