

# ARCONS-Spectrum Analysis

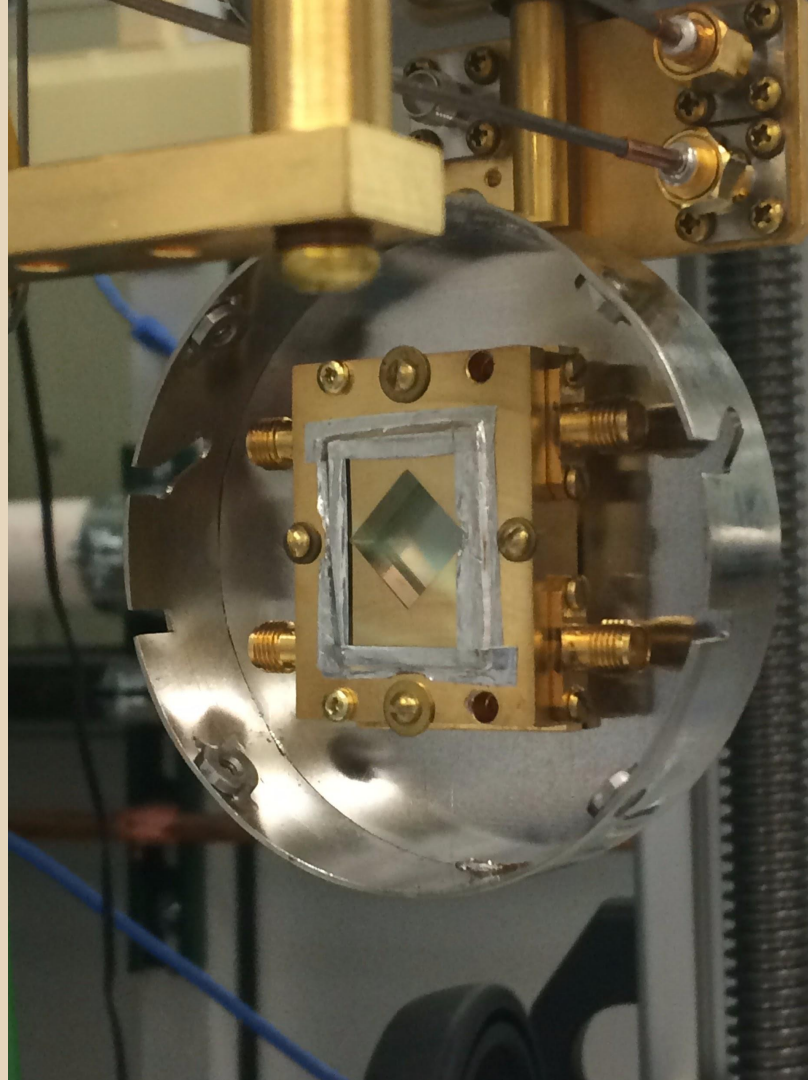
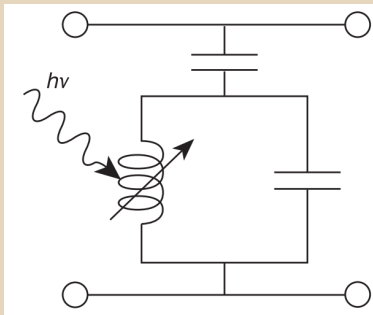
Timothy Burchfield

Array Camera for Optical to  
Near-IR Spectrophotometry. ◀

Array of MKIDs ◀

Microwave Kinetic  
Inductance Detector ◀

Pixels designed to resonate  
at different frequencies ◀



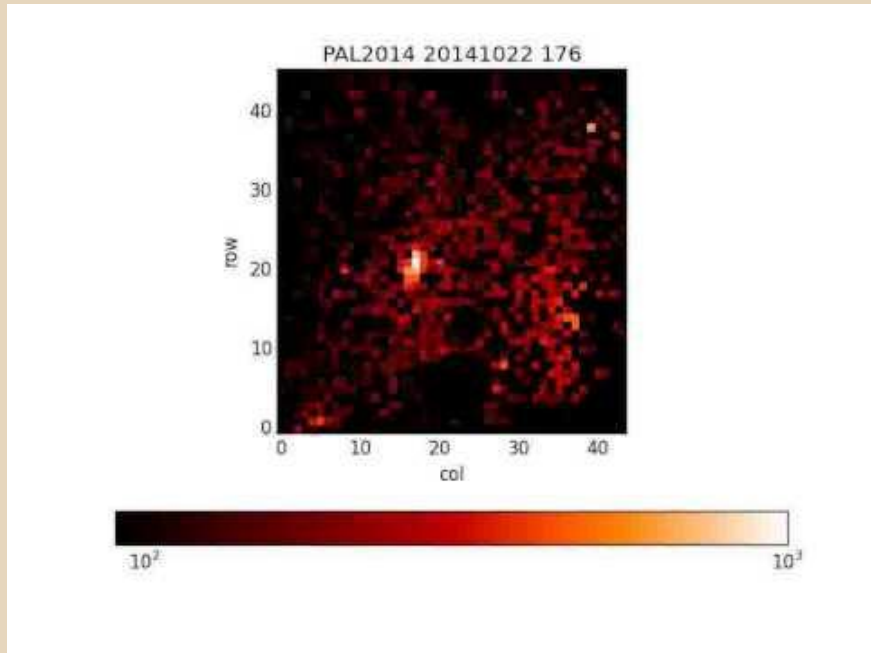
▶ Photons momentarily  
change their resonant  
frequencies

▶ Causes phase and  
amplitude shift related to  
energy of photon

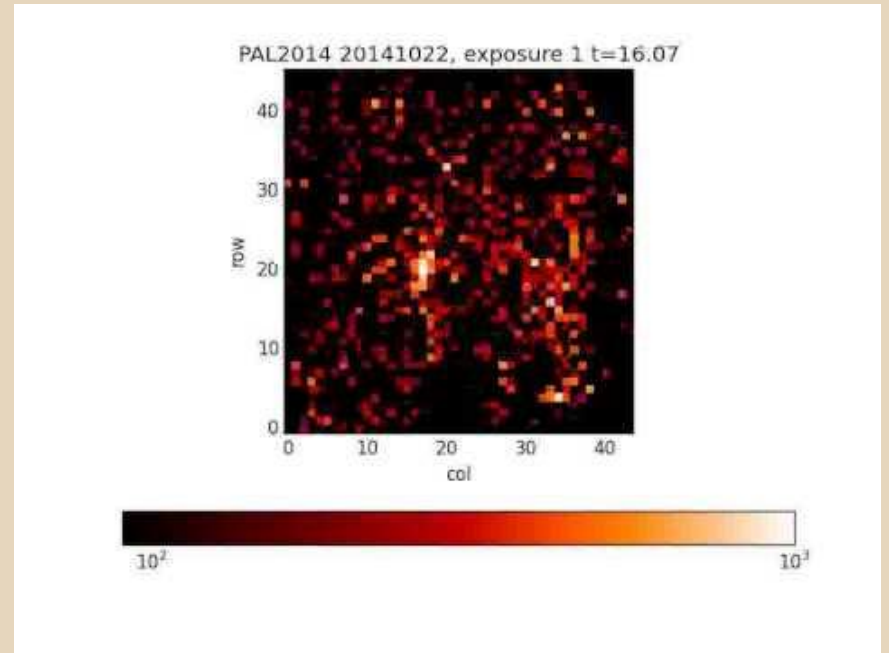
▶ Measure each  
photon's energy and  
arrival time

# Uses

- ▶ Time varying observations
  - ▶ Pulsars, Adaptive Optics
- ▶ Exoplanet Atmospheric Composition
- ▶ Dark Energy: supernova follow-up, galaxy shape, galaxy redshift
- ▶ Dark Matter: galaxy shape
  
- ▶ Spectrum Analysis



1/10 Second Exposures

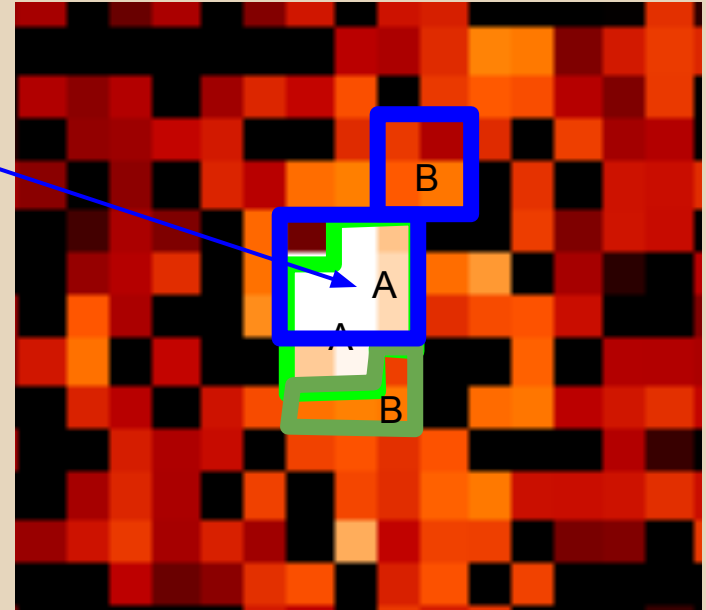


1/100 Second Exposures

PSN23441a Supernova Videos

# Initial Spectrum Approximation Methods

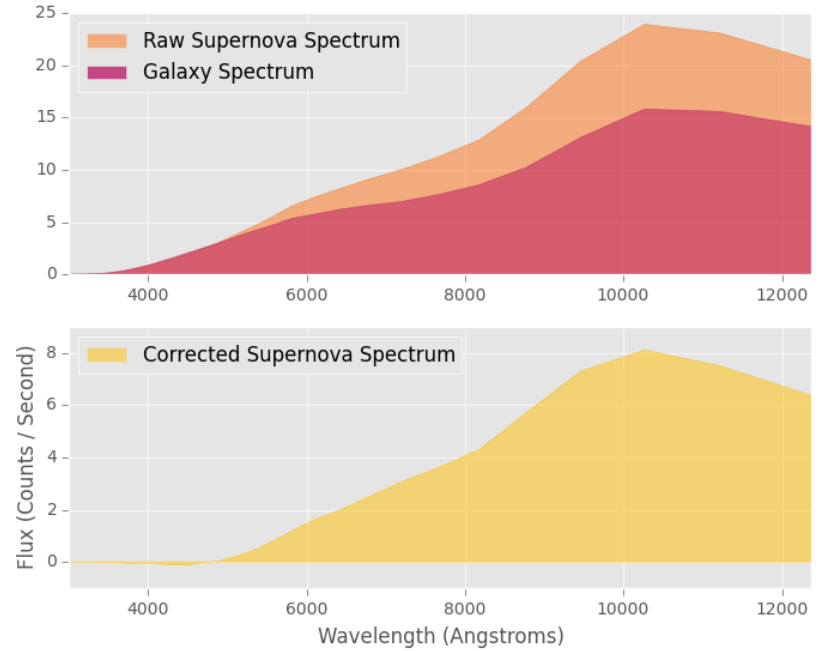
- ▶ Simple approximation
- ▶ Longer exposure pixel selection



► Simple Approximation

► Longer exposure pixel selection

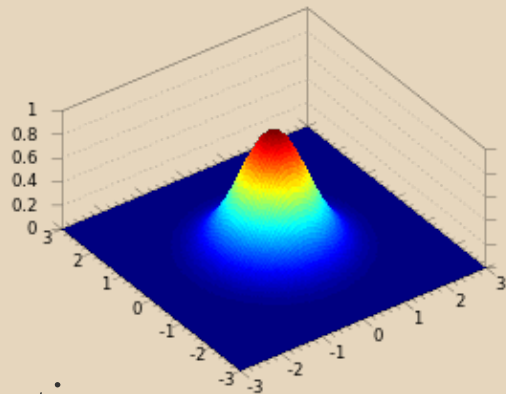
PSN234416a from 900 second exposure - 2014 - 10/22



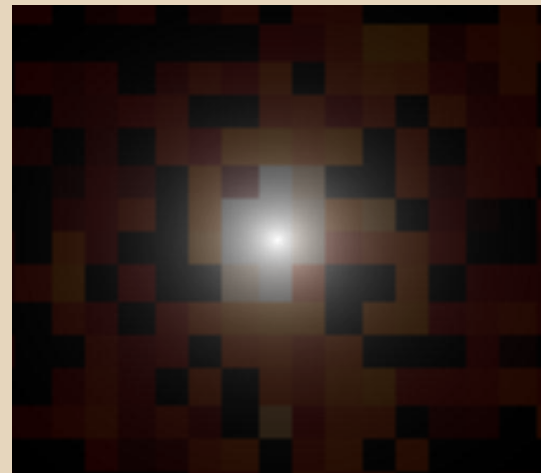
Results

# Standard ways

▶ PSF Photometry



▶ Point Spread Function

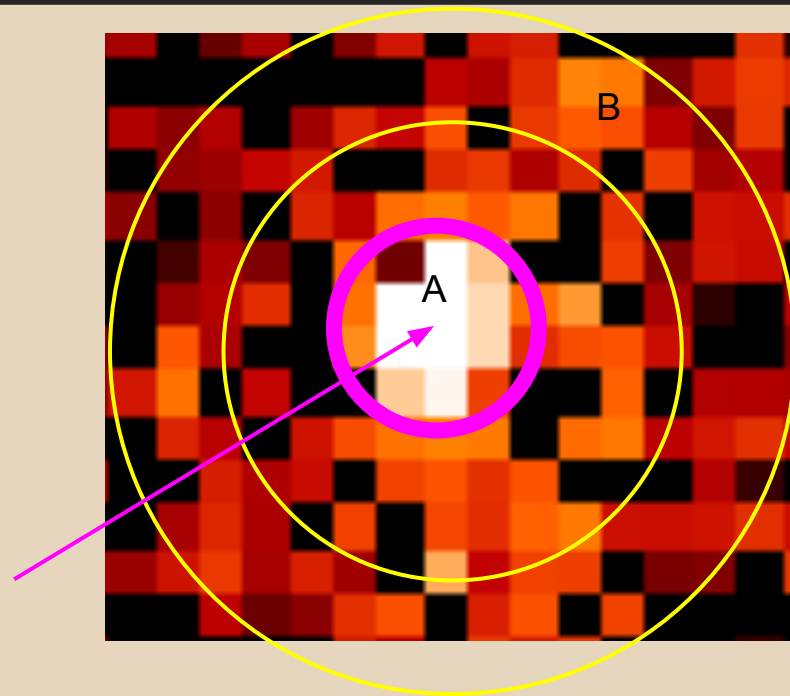


▶ Less consistent, more accurate

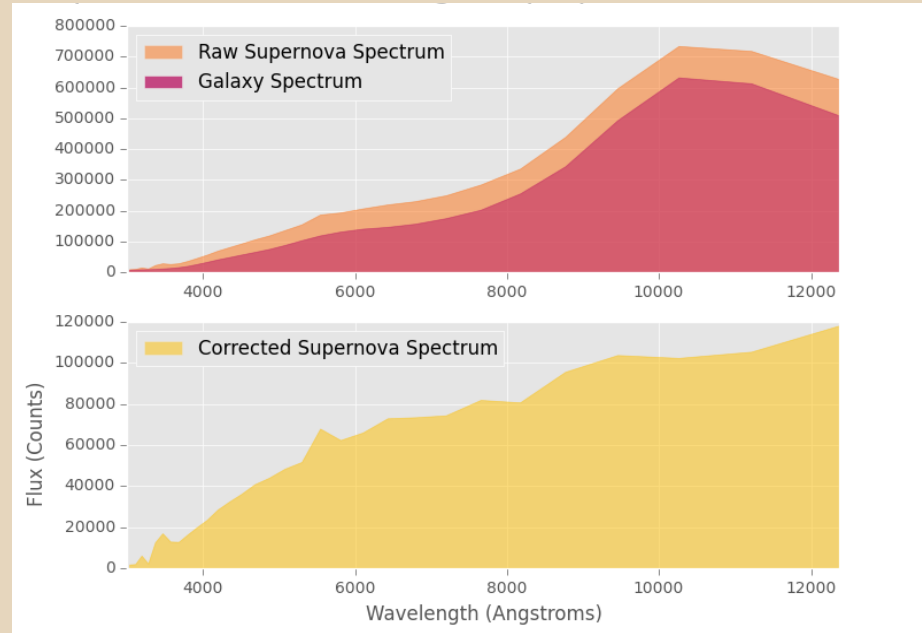


# Standard Ways

- ▶ Aperture Photometry
- ▶ Consistent
- ▶ Fast



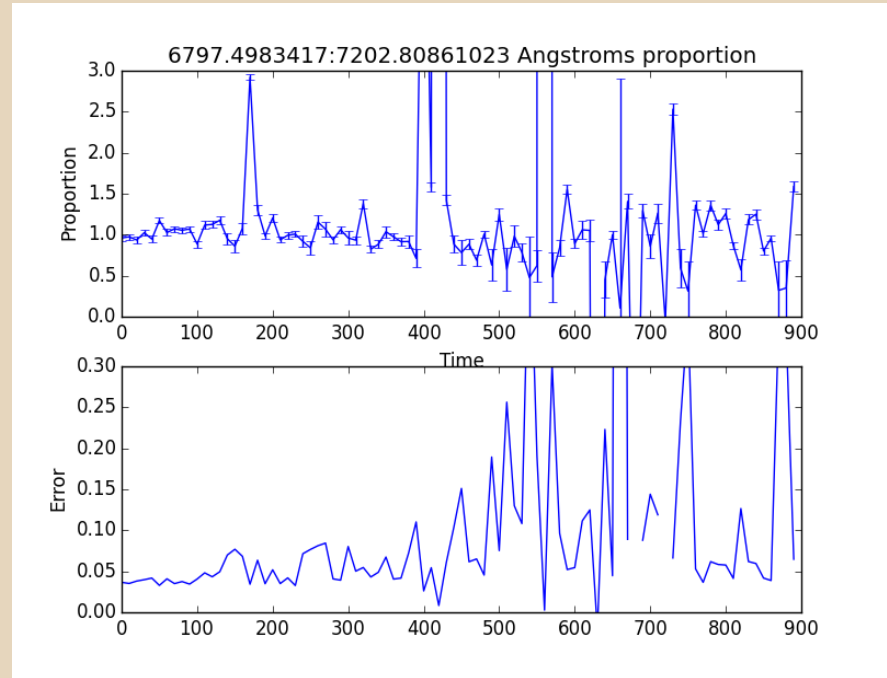




## Aperture Spectrum

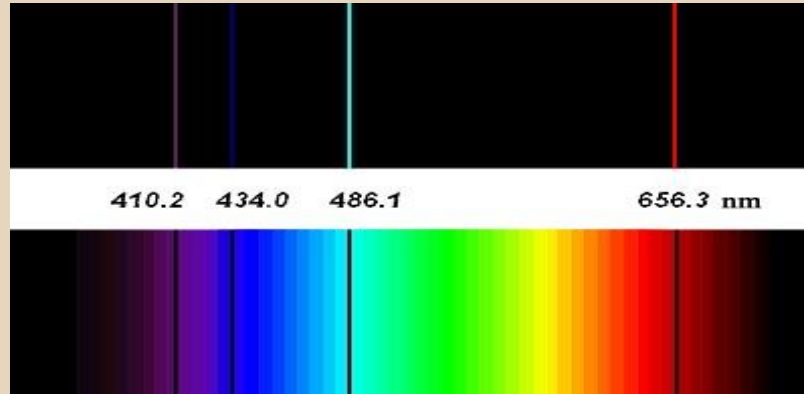
# Improvements

- ▶ Mask times with errant proportions.
- ▶ Convolve data.
- ▶ Collect more data.



# Where to from here

- ▶ Redshift
  - ▶ Dark Energy
  
- ▶ Object Information
  
- ▶ Color Pictures



# Acknowledgements

- ▶ Chris Stoughton
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