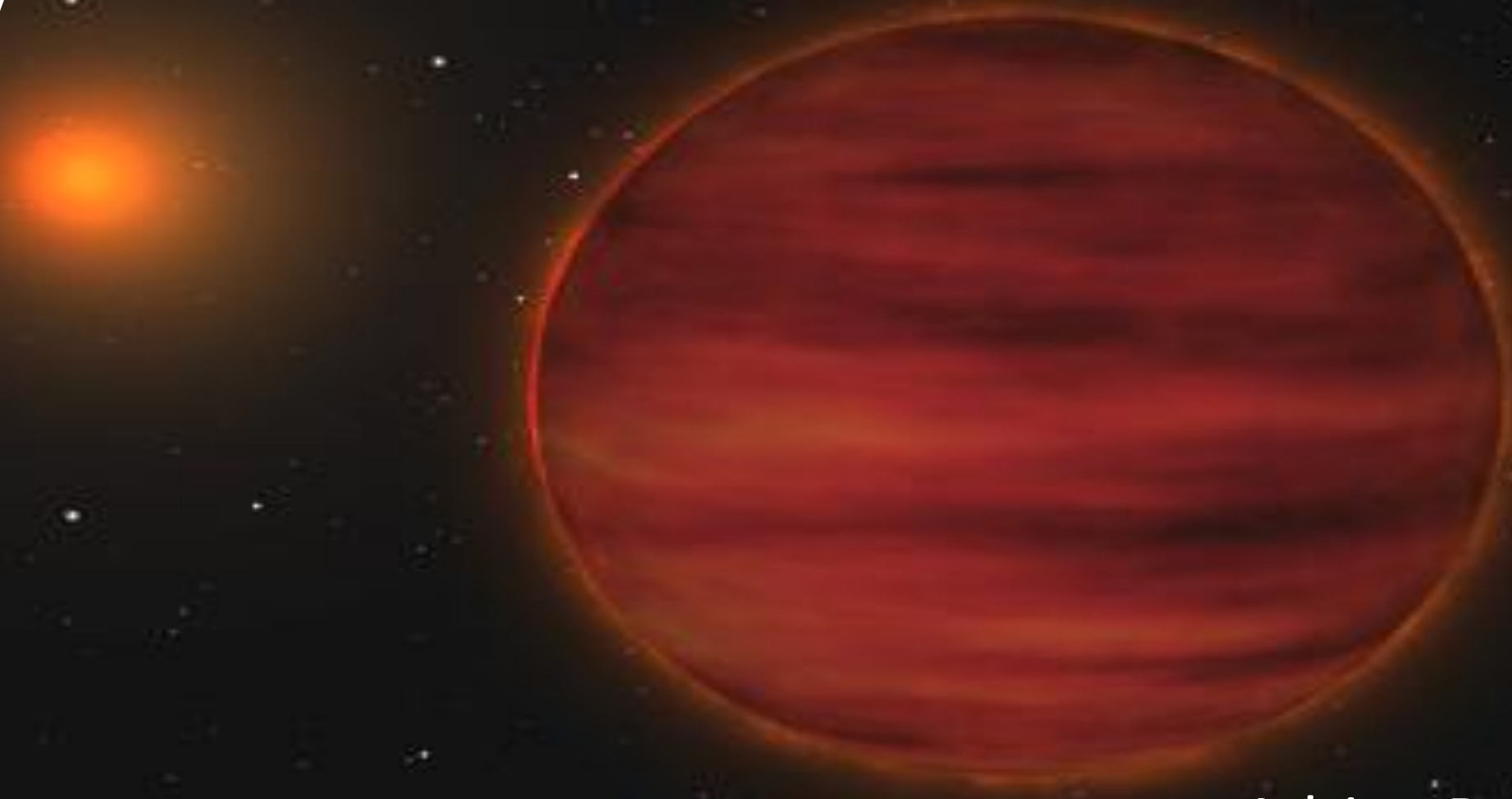


Dwarfs: Characterizing a Binary at the Hydrogen Fusion Boundary



Adrian R. Suarez

UCSD Summer Research Conference

Photo Credit: annesastronomynews

Agenda

- Background information on Brown Dwarfs and Spectral Binaries
- Goal of my research
- Background information on my source
- Different methods used and discuss the results of each
- Summarize results and future work
- Acknowledgements

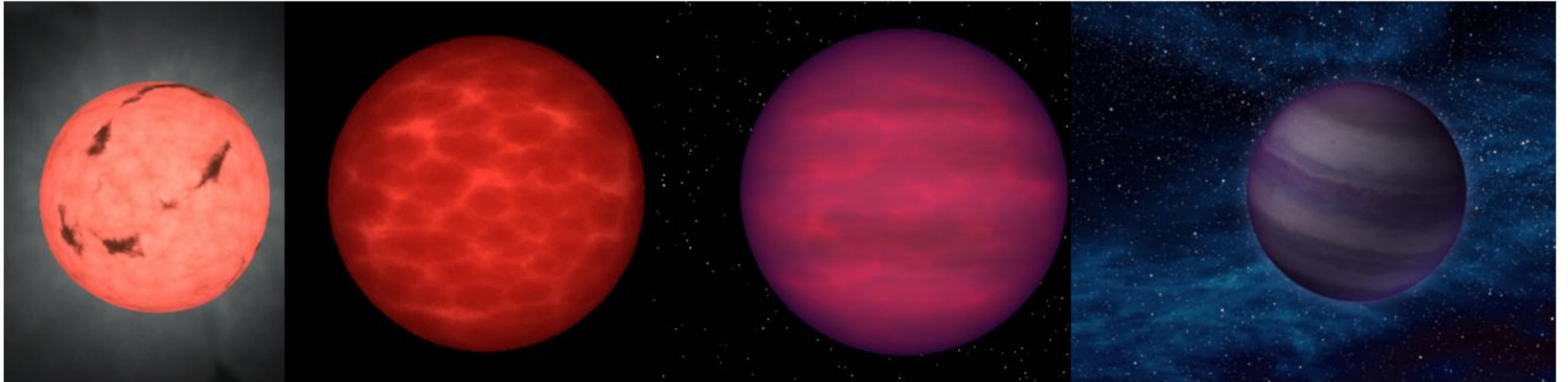
Background Information

M

L

T

Y



3500-2100K

2100-1300K

1300-600K

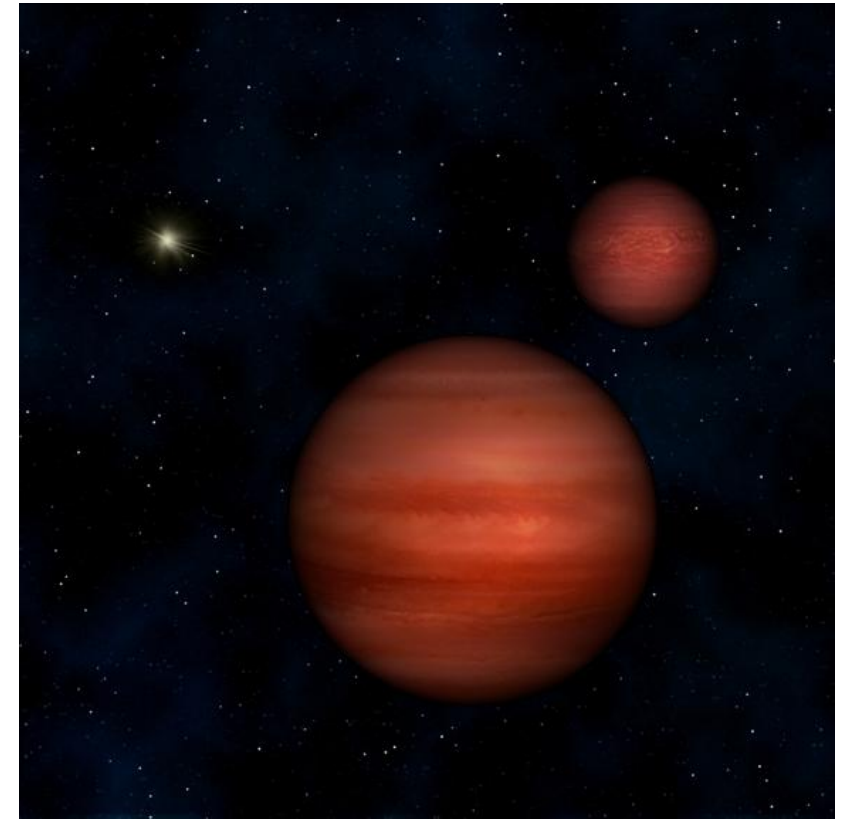
<600K

Photo Credit: NASA/JPL

Source Credit: Physics Today

Spectral Binaries and their Importance

- 20% are binary systems
- Sources whose spectrum show distinct peculiarities from combined light of components
- Better understand the formation of Brown dwarfs and brown dwarf spectral binaries



Source Credit: Burgasser et al. (2010) and Bardalez Gagliuffi et al. (2014)

Photo Credit: space.com

Goal of project

- Characterize the unresolved spectral binary **J1453+1420**
- Implementing tools into Spex Prism Library Analysis Toolkit (SPLAT)
- An understanding of my source will help with the identification and characterization of future binaries

Background information on my Source

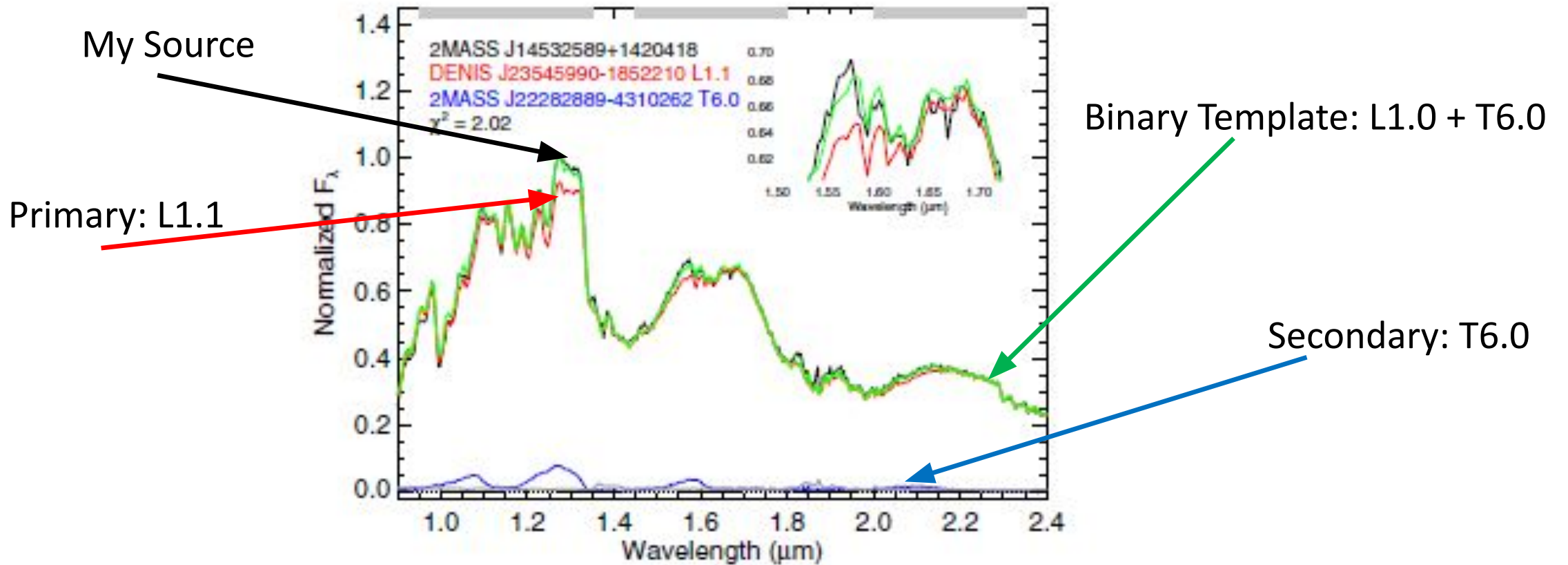


- IRCS Coordinates: 14 53 25.829 +14 20 41.01
- Distance: 40.3 parsecs [7.7 parsecs]
- Spectral Type: L2.0
- Gravity Classification: Field

Photo Credit: Digital Sky Survey

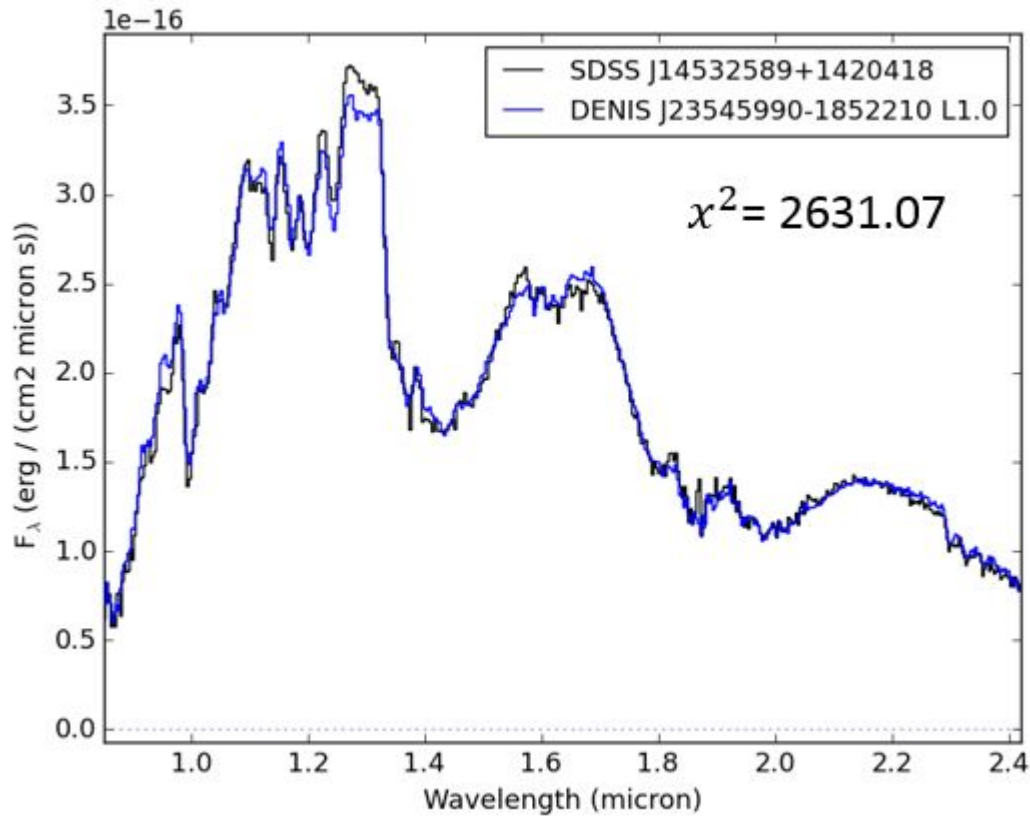
Source Credit: VizieR

Prior Analysis



Standard Template

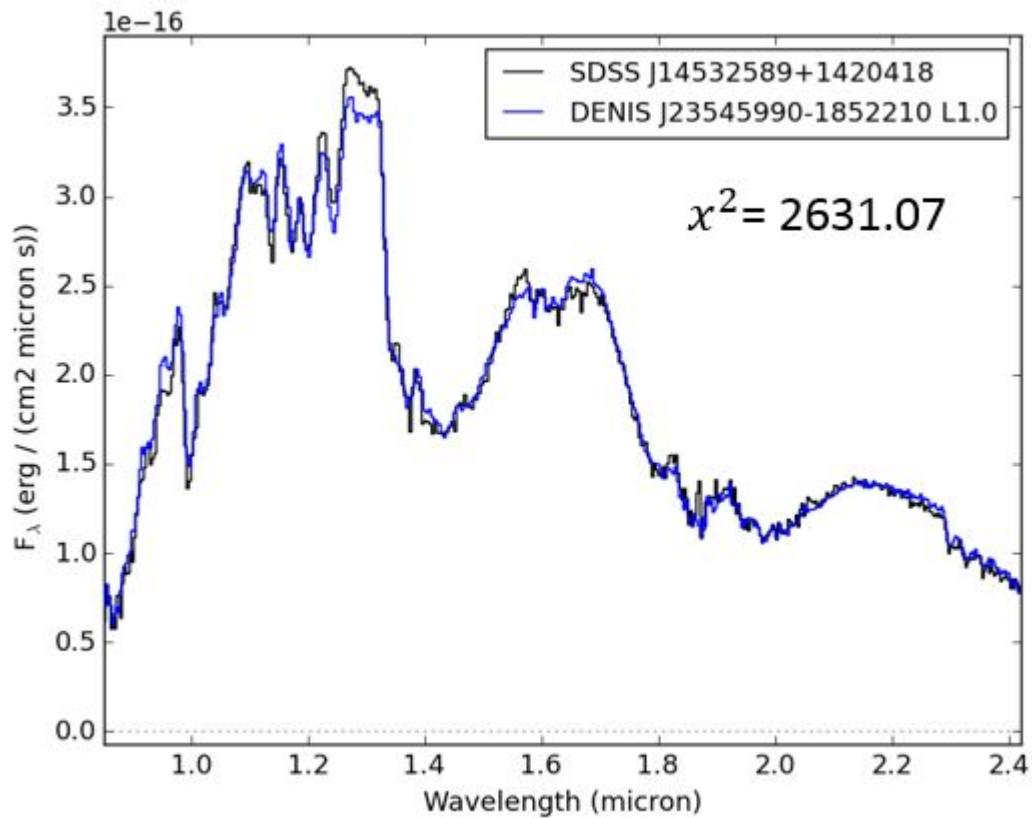
Classify by Template



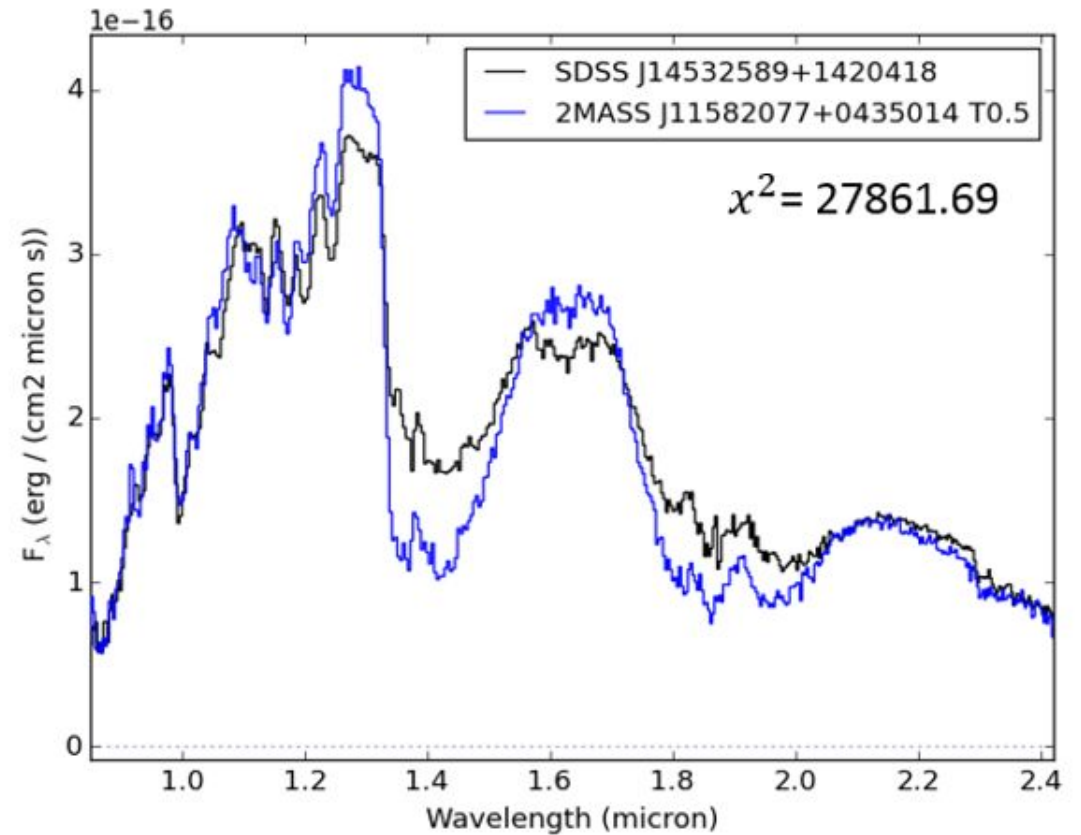
- Used SPLAT routine to perform comparison to other brown dwarf spectra
- Fitted the dwarf J2354-1852 (L1.0)
- Deviates too much at around 1.3 microns
- Not a sufficient fit

Best Subdwarf Template

Classify by Template

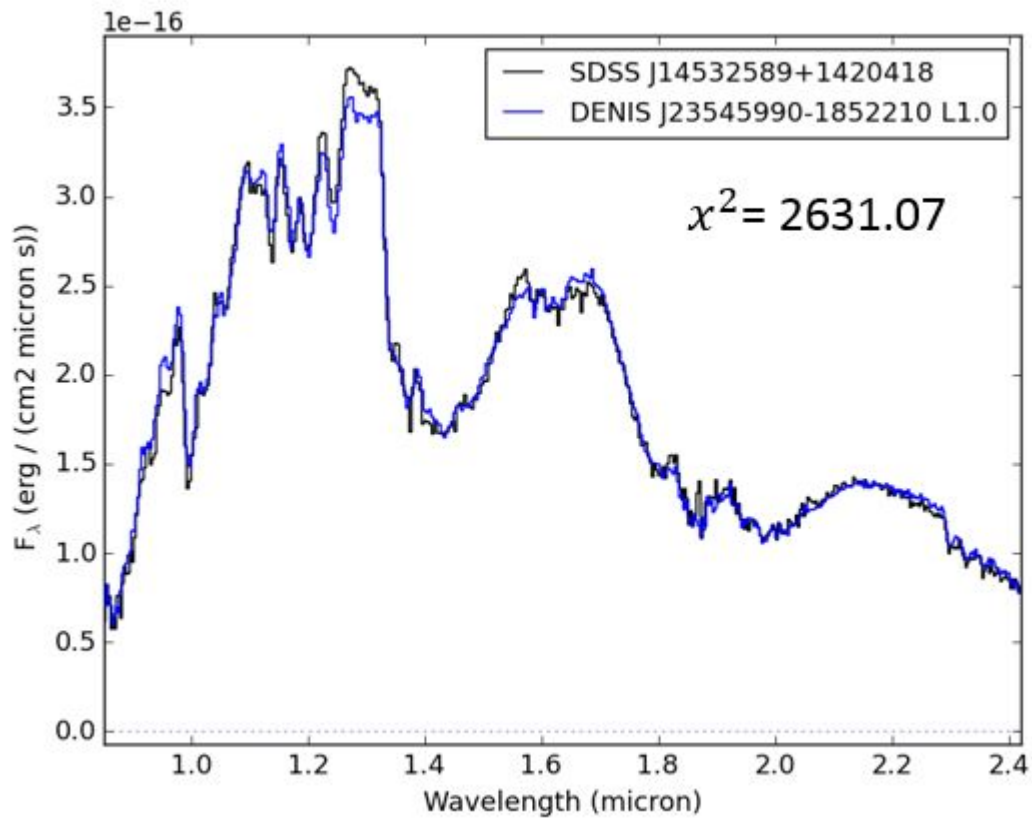


Best Subdwarf Fit

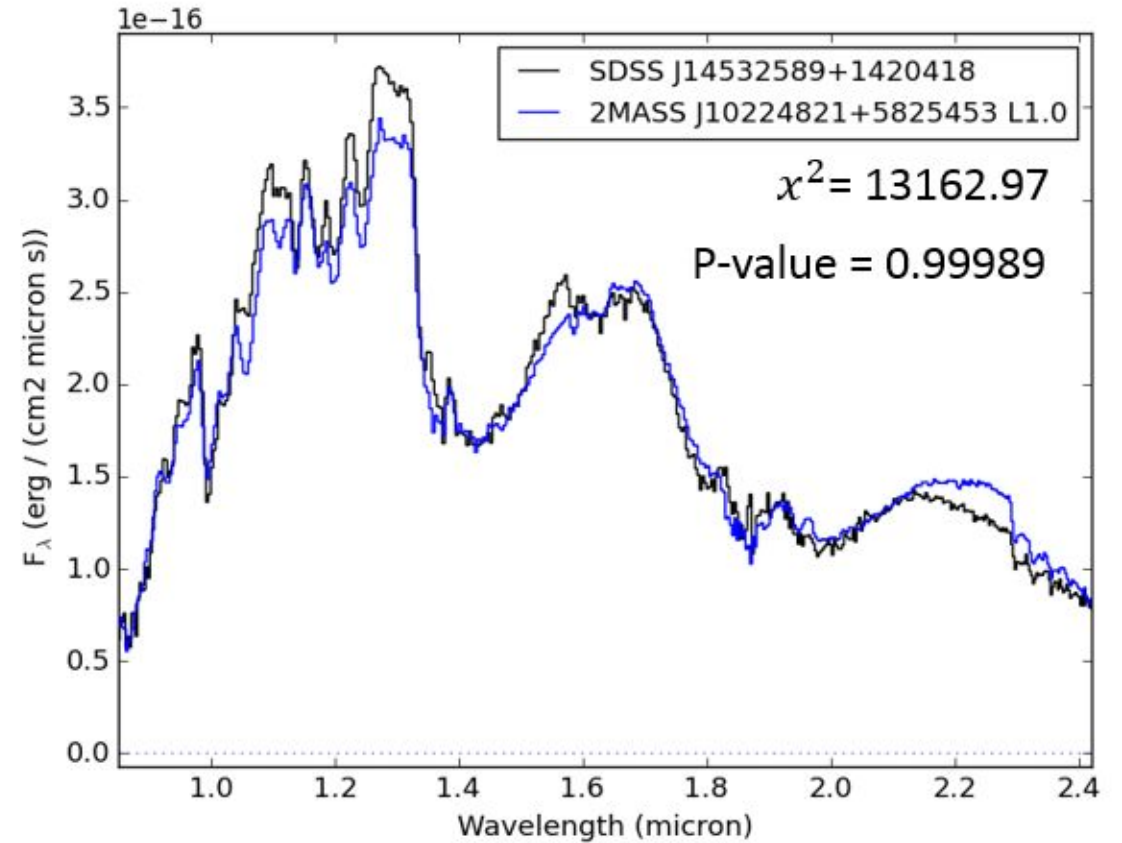


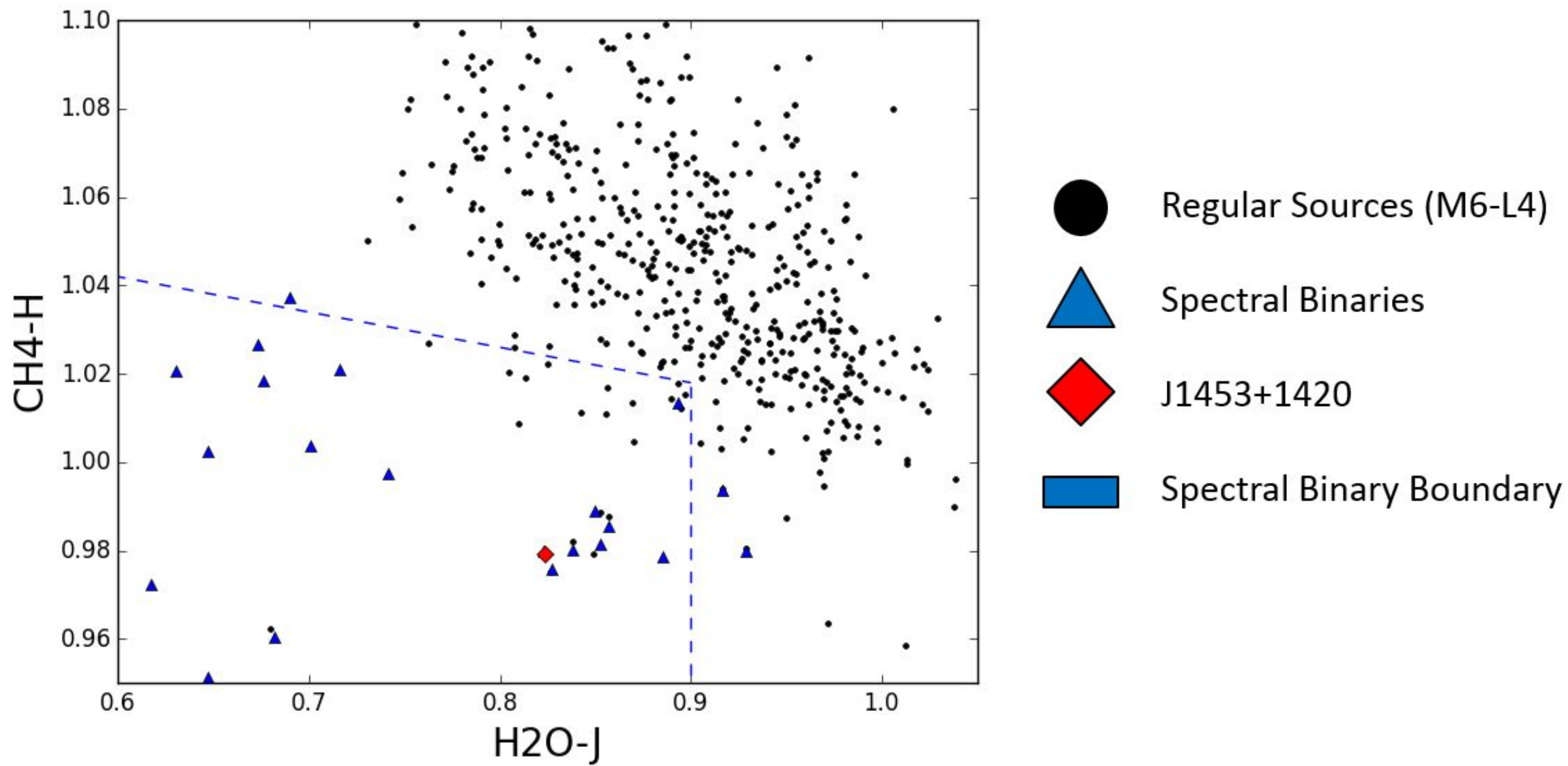
Best Young Template

Classify by Template

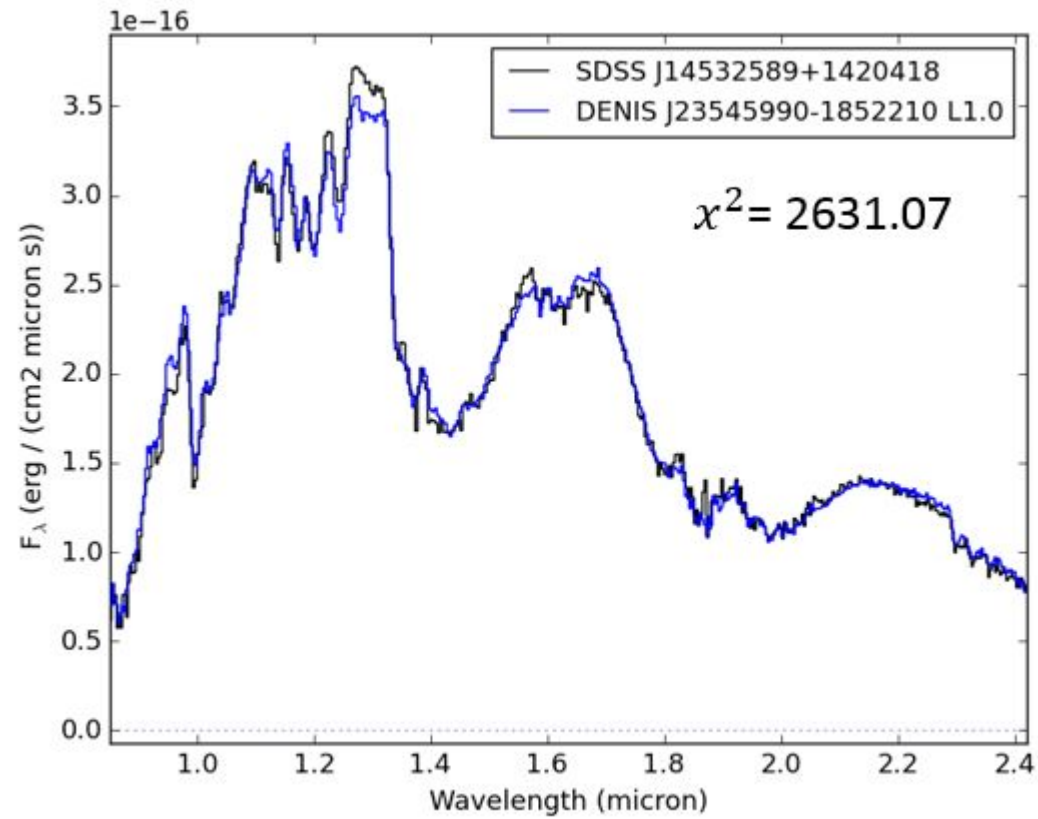


Best Young Fit

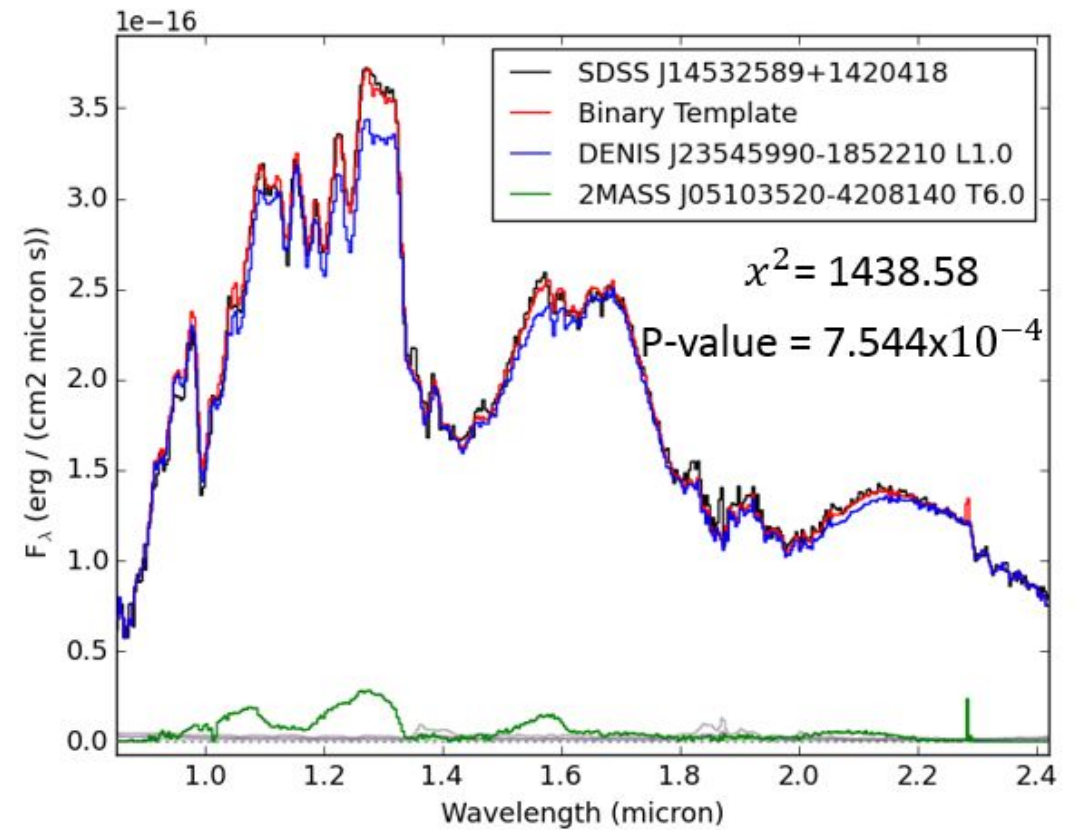




Classify by Template



Constructed Binary Template



Summary of Results and Next Steps

- My source fell in 11 of the 12 selected regions
- Fitted to a binary template composed of a L1 primary and a T6 secondary
- Use model fitting to calculate primary and secondary masses
- Implement a more efficient binary fitting method

Acknowledgements

UC San Diego

CAMPARE

STARS

PI: Adam Burgasser

Lab Group: Daniella Bardalez Galiguffi, Christian Aganze, Caleb Choban, and Greta Mercado

References

- Bardalez Gagliuffi, Daniella C., et al. *SpeX Spectroscopy of Unresolved Very Low Mass Binaries: Identification of 14 Candidate Binaries with Late-M/Early-L and T Dwarf Components*. N.p.: Astrophysical Journal, 2014. Print.
- Burgasser, Adam J., et al. *SpeX Spectroscopy of Unresolved Very Low Mass Binaries. I. Identification of 17 Candidate Binaries Straddling the L Dwarf/T Dwarf Transition*. N.p.: The Astrophysical Journal, 2010. Print.
- "Digital Sky Survey." Map. *IRSA*. N.p., n.d. Web. 12 Aug. 2015.
<http://irsa.ipac.caltech.edu/applications/finderchart/#id=Hydra_finderchart_finder_chart&RequestClass=ServerRequest&DoSearch=true&subsize=0.08333333400000001&thumbnail_size=medium&sources=DSS,S DSS,twomass,WISE&overlayisSearchResult=true>.
- "Vizier." *Vizier*. Centre de Données astronomiques de Strasbourg, n.d. Web. 12 Aug. 2015. <<http://vizier.u-strasbg.fr/vizbin/VizieR4?ref=VIZ5509063b0789&to=4c%3DGo%21b&from=1&this=4c%3DGo%21&%2F%2Fc=14+53+25.89+%2B14+20+41.8&out.max=50&%2F%2FCDSportal=http%3A%2F%2Fcdsportal.u-strasbg.fr%2FStoreVizierData.html&out.form=HTML+Table&out.add>>.