Kellen D. Lawson

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Education

PhD (Physics), Spring 2022 (anticipated) — University of Oklahoma, Norman, Oklahoma
Advisor: John Wisniewski

BSc (Astrophysics), Fall 2014 — College of Charleston, Charleston, South Carolina

Research Interests

- High-contrast imaging of circumstellar disks & exoplanets
- Integral field spectroscopy and polarimetry
- Software development
- Optimization algorithms

Research Experience

Graduate Research Assistant (2018–Present) — University of Oklahoma
Advisor: John Wisniewski; dissertation work reducing, analyzing, and modeling high-contrast integral field spectroscopic and polarimetric imagery from the Subaru observatory's SCExAO/CHARIS to study circumstellar disks and exoplanets.

Graduate Research Assistant (2017–2018) — Univ. of Oklahoma & Univ. of Washington
Advisor: John Wisniewski & coadvisor: Eric Bellm; developed techniques for the identification of flare star candidates in sparsely sampled time-series photometry from the Palomar Transient Factory (PTF).

Undergraduate Researcher (2013–2015) — College of Charleston
Advisor: Joe Carson; worked to identify and assess planet candidates in high-contrast imagery from the Subaru Observatory's HiCIAO as part of the Strategic Exploration of Exoplanets and Disks with Subaru (SEEDS) survey.

Refereed Publications

1. *"SCExAO/CHARIS Near-IR Integral Field Spectroscopy of the HD 15115 Debris Disk"*, **Lawson, K.**, Currie, T., Wisniewski, J., et al., 2020, AJ, 160, 163
2. *"Discovery of a Nearby Young Brown Dwarf Disk"*, Schutte, M., **Lawson, K.**, Wisniewski, J., et al., 2020, AJ, 160, 156
3. *"Peter Pan Disks: Long-lived Accretion Disks Around Young M Stars"*, Silverberg, S., Wisniewski, J., Kuchner, M., **Lawson, K.**, et al., 2020, ApJ, 890, 106
4. *"Identification of Stellar Flares Using Differential Evolution Template Optimization"*, **Lawson, K.**, Wisniewski, J., Bellm, E., Kowalski, A., & Shupe, D., 2019, AJ, 158, 119
5. *"Radial Velocity Discovery of an Eccentric Jovian World Orbiting at 18 au"*, Blunt, S., Endl, M., Weiss, L., ... **Lawson, K.**, et al., 2019, AJ, 158, 181
6. *"High-fidelity Imaging of the Inner AU Mic Debris Disk: Evidence of Differential Wind Sculpting?"*, Wisniewski, J., Kowalski, A., Davenport, J., ... **Lawson, K.**, et al., 2019, ApJL, 883, L8
7. *"No Clear, Direct Evidence for Multiple Protoplanets Orbiting LkCa 15: LkCa 15 bcd are Likely Inner Disk Signals"*, Currie, T., Marois, C., Cieza, L., ... **Lawson, K.**, et al., 2019, ApJL, 877, L3

Presentations

1. *"SCExAO/CHARIS Near-IR Integral Field Spectroscopy of the HD 15115 Debris Disk"*, ExSoCal 2020, September, 2020
2. *"SCExAO/CHARIS Near-IR Integral Field Spectroscopy of the HD 15115 Debris Disk"*, Univ. of Michigan – Star & Planet Formation Journal Club, August, 2020
3. *"SCExAO/CHARIS Near-IR Integral Field Spectroscopy of the HD 15115 Debris Disk"*, 236$^{\text{th}}$ AAS Meeting, June, 2020
4. *"The Subaru SEEDS Direct Imaging Survey for Planets of Early-Type Stars"*, 225$^{\text{th}}$ AAS Meeting, January, 2015
5. *"The Subaru SEEDS Direct Imaging Survey for Planets of Early-Type Stars"*, South Carolina Academy of Sciences Meeting, April, 2014

Public Service and Outreach

Lunar Sooners (2016–Present) University of Oklahoma

A student organization that introduces under-represented Oklahoma communities to astronomy using a portable planetarium, public telescope observing, discussion panels, and demonstrations. Selected Lunar Sooners events I co-hosted:

- SW OKC Public Library (Jun. 4, 2019) – Demos and Q&A with kids 5-12 as part of the library's summer camp program
- "Soonertarium" at Jay Elementary (Oct. 9, 2018) – All-day event for elementary school groups using our inflatable planetarium
- Boys and Girls Club of Norman (Jun. 26, 2018) – Astronomy demonstrations for K-12 kids

PyVAN github.com/kdlawson/pyvan

A publicly available Python package for assessing variability of candidate lightcurves, especially suited to irregularly sampled light-curves of ground based astronomical surveys.

Grants & Awards

Research Presentation Grant ($450) – 2014 College of Charleston

Funding for travel to Seattle to present a poster on my senior research project at the 2015 AAS meeting.

Major Academic Year Support Grant ($1000) – 2014 College of Charleston

Funding for my research on the SEEDS exoplanet survey with advisor Joe Carson.

Dunlap Institute Summer School, Tuition & Travel Grant (800 CAD) – 2014 Univ. of Toronto

Funding for tuition and travel to Univ. of Toronto's Dunlap Institute instrumentation summer program.

Richard Petit Award for Outstanding Undergraduate Research ($100) – 2014 Sigma Xi

Awarded for my 15 minute presentation on my undergraduate work as part of the SEEDS survey.

Summer Undergraduate Research with Faculty Grant ($2000) – 2014 College of Charleston

Funding for my research on the SEEDS exoplanet survey with advisor Joe Carson.

Major Academic Year Support Grant ($1000) – 2013 College of Charleston

Funding for my research on the SEEDS exoplanet survey with advisor Joe Carson.

Computational Skills

Programming Languages –

- Python: image processing and analysis, optimization algorithms, time-series analysis, multi-threading, GPU computing, plotting, animation
- IDL: image processing and analysis, optimization algorithms, plotting

Data Processing and Analysis –

- High contrast imaging data extraction, calibration, PSF subtraction, and forward modeling
- 3D radiative transfer and scattered light modeling of circumstellar disks
- Time-series / lightcurve analysis (especially relating to sparsely sampled data)
- Advanced optimization for complex/multidimensional parameter spaces