Kellen D. Lawson

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──────────────────────── **Education** ────────────────────────

Doctor of Philosophy (Physics) — Univ. of Oklahoma, 2016 – 2022 (anticipated)   (Advisor: John Wisniewski)
Bachelor of Science (Astrophysics) — College of Charleston, 2010 – 2014   (Advisor: Joseph Carson)

──────────────────────── **Research Interests** ────────────────────────

▷ High-contrast imaging of circumstellar disks & exoplanets   ▷ Software development

▷ Integral field spectroscopy and polarimetry   ▷ 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
  Advisors: John Wisniewski & Eric Bellm; developed techniques for the identification of flare star candidates in sparsely sampled time-series photometry from the Palomar Transient Factory (PTF).

Undergraduate Research Assistant (2013–2015)   College of Charleston
  Advisor: Joseph 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.

──────────────────────── **Publications** ────────────────────────

▷ **Refereed Journal Articles**

Currie, T., **Lawson, K.**, Schneider, G., et al. 2021, "*Images of Embedded Jovian Planet Formation At Wide Separations*", submitted to Nature Astronomy

Lawson, K., Currie, T., Wisniewski, J., et al. 2021, "*Multiband imaging of the HD 36546 debris disk: a refined view from SCExAO/CHARIS*", AJ, 162, 293

Currie, T., . . . **Lawson, K.**, et al. 2020, "*SCExAO/CHARIS Direct Imaging Discovery of a 20 au Separation, Low-mass Ratio Brown Dwarf Companion to an Accelerating Sun-like Star*", ApJL, 904, L25

Lawson, K., Currie, T., Wisniewski, J., et al. 2020, "*SCExAO/CHARIS Near-IR Integral Field Spectroscopy of the HD 15115 Debris Disk*", AJ, 160, 163

Schutte, M., **Lawson, K.**, Wisniewski, J., et al. 2020, "*Discovery of a Nearby Young Brown Dwarf Disk*", AJ, 160, 156

Silverberg, S., Wisniewski, J., Kuchner, M., **Lawson, K.**, et al. 2020, "*Peter Pan Disks: Long-lived Accretion Disks Around Young M Stars*", ApJ, 890, 106

Lawson, K., Wisniewski, J., Bellm, E., Kowalski, A., & Shupe, D. 2019, "*Identification of Stellar Flares Using Differential Evolution Template Optimization*", AJ, 158, 119

Blunt, S., . . . **Lawson, K.**, et al. 2019, "*Radial Velocity Discovery of an Eccentric Jovian World Orbiting at 18 au*", AJ, 158, 181

Wisniewski, J., . . . **Lawson, K.**, et al. 2019, "*High-fidelity Imaging of the Inner AU Mic Debris Disk: Evidence of Differential Wind Sculpting?*", ApJL, 883, L8

Currie, T., . . . **Lawson, K.**, et al., 2019, "*No Clear, Direct Evidence for Multiple Protoplanets Orbiting LkCa 15: LkCa 15 bcd are Likely Inner Disk Signals*", ApJL, 877, L3

▷ **Conference Proceedings**

Lawson, K., Currie, T., Wisniewski, J., et al. 2021, "*High-contrast integral field spectropolarimetry of planet-forming disks with SCExAO/CHARIS*", Proc. SPIE 11823, 118230D

Currie, T., . . . **Lawson, K.**, et al. 2021, "*A new type of exoplanet direct imaging search: a SCExAO/CHARIS survey of accelerating stars*", Proc. SPIE 11823, 1182304

Currie, T., . . . **Lawson, K.**, et al. 2020, *"On-sky performance and recent results from the Subaru coronagraphic extreme adaptive optics system"*, Proc. SPIE 11448, 114487H

Presentations

▷ Invited

"High-contrast integral field spectropolarimetry of planet-forming disks with SCExAO/CHARIS", University of Kansas Astronomy and Space Physics Seminar, Nov 2021

▷ Contributed

"High-contrast integral field spectropolarimetry of planet-forming disks", STScI ESPF Seminar Series, Nov 2021

"High-contrast integral field spectropolarimetry of planet-forming disks with SCExAO/CHARIS", SPIE Optical Engineering + Applications, Aug 2021

"SCExAO/CHARIS High-Contrast Integral Field Spectropolarimetry of Planet-Forming Disks", Subaru Users Meeting FY2020, Mar 2021

"SCExAO/CHARIS Near-IR Integral Field Spectroscopy of the HD 15115 Debris Disk", Univ. of Michigan Star and Planet Formation Journal Club, Aug 2020

"SCExAO/CHARIS Near-IR Integral Field Spectroscopy of the HD 15115 Debris Disk", AAS 236, Jun 2020

Grants & Awards

Bullard Dissertation Completion Fellowship (2021) — $15000		OU Graduate College
Grants in Aid of Research (2020) — $3933		Sigma Xi
Research Presentation Grant (2014) — $450		College of Charleston
Major Academic Year Support Grant (2014) — $1000		College of Charleston
Dunlap Institute Summer School Tuition & Travel Grant (2014) — 800 CAD		Univ. of Toronto
Richard Petit Award for Outstanding Undergraduate Research (2014) — $100		Sigma Xi
Summer Undergraduate Research with Faculty Grant (2014) — $2000		College of Charleston
Major Academic Year Support Grant (2013) — $1000		College of Charleston

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Outreach & Service

Lunar Sooners (2016 – Present)   University of Oklahoma

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

- ▷ SW OKC Public Library (Jun 2019) – Astronomy demos and Q&A with children ages 5-12
- ▷ "Soonertarium" at Jay Elementary (Oct 2018) – All-day elementary school event using our portable planetarium
- ▷ Boys and Girls Club of Norman (Jun 2018) – Astronomy demonstrations for K-12 students

CHARIS DPP – spectropolarimetry module (2021)   github.com/thaynecurrie/charis-dpp

An addition to the publicly available IDL data processing pipeline for Subaru/CHARIS data. This module provides calibrated final products for data from CHARIS's integral field spectropolarimetry mode.

PyVAN (2019)   github.com/kdlawson/pyvan

A publicly available Python package for assessing variability of candidate lightcurves, especially suited to irregularly sampled light-curves from ground based astronomical surveys (Lawson et al., 2019).

Proficiencies

Data Processing and Analysis

- ▷ Advanced optimization for complex/multidimensional parameter spaces
- ▷ High contrast imaging data extraction, calibration, PSF subtraction, and disk/planet forward modeling
- ▷ 3D radiative transfer and scattered light modeling of circumstellar disks
- ▷ Time-series / lightcurve analysis

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