Elias K. Oakes

196A Auditorium Road
Storrs, CT 06269
orcid.org/0000-0002-0119-1115
+1 (917) 671 8276
elias.oakes@uconn.edu
eoakes.github.io

Education

The University of Connecticut Storrs, CT — August 2021 - Present
Ph.D. Physics — *Expected May 2027*
M.S. Physics — August 2024
Advisor: Christopher M. Faesi

The University of Chicago Chicago, IL — September 2016 - June 2020
B.S. Astrophysics with Honors; **B.A.** Physics
Advisor: Wendy L. Freedman

Awards and Honors

Conference Participation Award — July 2024
$750 grant

NASA Connecticut Space Grant Consortium — June - August 2022
$8,000 over three months

Chambliss Astronomy Achievement Award — January 2021
Honorable mention

National Merit Scholar — 2016 - 2020
$16,000 over four years

Dean's Fund for Undergraduate Research — December 2019
$1,346.42 grant

University of Chicago Dean's List — 2016 - 2018

Professional Experience

Graduate Research Assistant — August 2021 - Present
University of Connecticut, Storrs, CT
Investigating the structure of the interstellar medium and its relation to star formation in nearby galaxies using wide-field, high-resolution ALMA, MUSE, and JWST data as part of the PHANGS collaboration.

Charge Injection Systems Expert — June 2020 - July 2021
CERN, Meyrin, Switzerland
Upgraded, calibrated, and maintained the Hadronic Tile Calorimeter on the ATLAS experiment at the Large Hadron Collider, with a focus on the charge injection and cooling systems.

Undergraduate Research Assistant — September 2017 - August 2021
Kavli Institute for Cosmological Physics, Chicago, IL
Measured three new distances to the Fornax dwarf spheroidal galaxy, working with Prof. Wendy Freedman in the Carnegie-Chicago Hubble Program.

Research Intern — June - September 2019
REU Program at the Max Planck Institute for Astronomy, Heidelberg, Germany
Developed methods to associate giant molecular clouds and HII regions in overlapping ALMA and VLT/MUSE data, working with Prof. Christopher Faesi in the PHANGS collaboration.

Publications

"Constraining resolved extragalactic R_{21} variation with well calibrated ALMA observations." den Brok, J., **Oakes, Elias K.**, and the PHANGS collaboration. Submitted to *ApJ*.

"Cloud-scale gas properties, depletion times, and star formation efficiency per free-fall time in PHANGS–ALMA." Leroy, A. et al. (incl. **Oakes, Elias K.**) and the PHANGS collaboration. Submitted to *ApJ*.

"The Fraction of Dust Mass in the Form of PAHs on 10–50 pc Scales in Nearby Galaxies." Sutter, J. et al. (incl. **Oakes, Elias K.**) and the PHANGS collaboration 2024, Accepted to *ApJ*, arxiv:astro-ph/2405.15102.

"PHANGS-JWST: Data Processing Pipeline and First Full Public Data Release." Williams, T. G. et al. (incl. **Oakes, Elias K.**) and the PHANGS collaboration 2024, *ApJS*, **273**, 13.

"The impact of HII regions on Giant Molecular Cloud properties in nearby galaxies sampled by PHANGS ALMA and MUSE." Zakardjian, A., Pety, J., Herrera, C. N., Hughes, A., **Oakes, Elias K.**, and the PHANGS collaboration 2023, *A&A*, **678**, A171.

"Distances to Local Group Galaxies via Population II, Stellar Distance Indicators II: The Fornax Dwarf Spheroidal." **Oakes, Elias K.**, Hoyt, T. J., Freedman, W. L., Madore, B. F., Tran, Q. H., Cerny, W., Beaton, R. L., and Seibert, M. 2022, *ApJ*, **786**, 64.

"Distances to Local Group Galaxies via Population II, Stellar Distance Indicators I: The Sculptor Dwarf Spheroidal." Tran, Q. H., Hoyt, T. J., Freedman, W. L., Madore, B. F., **Oakes, Elias K.**, Cerny, W., Hatt, D., and Beaton, R. L. 2022, *ApJ*, **935**, 34.

"Multi-Wavelength, Optical (VI) and Near-Infrared (JHK) Calibration of the Tip of the Red Giant Branch Method based on Milky Way Globular Clusters." Cerny, W., Freedman, W. L., Madore, B. F., Ashmead, F., Hoyt, T., **Oakes, Elias K.**, Tran, Q. H., and Moss, B. 2020, arxiv:astro-ph/0507244.

Scientific Talks and Posters

"The Many Scales of Molecular Gas: Searching for bound structures in NGC 253." Talk presented at ALMABO24, September 9, 2024, Bologna, Italy.

"The Many Scales of Molecular Gas: Searching for bound structures in NGC 253." Invited talk presented at OSU Galaxy Coffee, August 19, 2024, Columbus, Ohio.

"The Many Scales of Molecular Gas: Searching for bound structures in NGC 253." Talk presented at UNAM IRyA, June 18, 2024, Morelia, Mexico.

"Are Giant Molecular Clouds Real? Searching for a virialized scale in NGC 253." Invited talk presented at MPIA Galaxy Coffee, October 5, 2023, Heidelberg, Germany.

"Are GMCs Real? Measuring the virial parameter at high resolution in NGC 253." Talk presented at Northeast Star and Planet Formation meeting, June 28, 2023, Cambridge, MA.

"Environmental dependence of star formation efficiency in spiral galaxy NGC 4254." Poster presented by Neal Krishna at AAS 241, January 8-12, 2023, Seattle, WA.

"Are GMCs Real? Measuring the virial parameter at high resolution in NGC 253." Poster presented at NASA CTSG Exposition, November 4, 2022, Windsor Locks, CT.

"Are Giant Molecular Clouds (GMCs) Real? Measuring the virial parameter at high resolution in NGC 253." Poster presented at From Stars to Galaxies II, June 20-24, 2022, Gothenburg, Sweden.

"Three Population II Distances to the Fornax Dwarf Spheroidal." Talk presented at UConn Physics Colloquium, March 30, 2022, Storrs, CT.

"The distance to the Fornax dSph via the tip of the red giant branch and horizontal branch stars." Poster presented at AAS 237, January 11-15, 2021 (remote due to COVID-19).

"The Cradles of Giants: Star formation at high resolution in nearby galaxies." Poster presented at AAS 235, January 4-8, 2020, Honolulu, HI.

"Observations and association of GMCs and HII regions in the PHANGS sample." Invited talk presented at MPIA Galaxy Coffee, August 29, 2019, Heidelberg, Germany.

"Aggregation as an efficiency driver in bulk heterojunction devices measured through mixed squaraines in ternary blends." Poster at SPIE Optics + Photonics, August 19-23, 2018, San Diego, CA.

"The role of H-aggregation on device efficiency as determined through squaraine sidegroup elongation and molecular separation in crystals." Poster presented at SPIE Optics + Photonics, August 19-23, 2018, San Diego, CA.

Service, Teaching, and Outreach

Undergraduate Thesis Mentor
Working with Lia Gilmore June 2024 - Present
Working with Neal Krishna August 2022 - July 2023
Group of Prof. Christopher Faesi

Mentoring and supervising undergraduate research projects, including a high-resolution study of the star formation scaling relation and a project characterizing the impact of AGN on nearby gas properties.

Managing Co-Lead July 2024 - Present
Graduate Student Co-Lead July 2022 - July 2024
UConn Science, Technology, and Astronomy Recruits (STARs)

Mentoring a cohort of 18 undergraduates from historically excluded backgrounds in physics to organize professional development workshops, social and community-building events, and public outreach to local schools.

Founding Member May 2022 - Present
PHANGS Colloquium and YouTube committees

Facilitate colloquium events and produce an external video series about PHANGS research.

Scientist Speaker July 2022 - Present
Skype a Scientist

Regularly discussing astrophysics via accessible, educational presentations. To date: 2022 (1 classroom, 2 groups); 2023 (2 classrooms, 1 group); 2024 (1 classroom, 1 summer camp).

Union Guide July 2023 - August 2024
District Steward September 2022 - August 2023
Graduate Employee & Postdoc Union - United Auto Workers Local 6950

Elected member of the executive board, responsible for coordinating stewards to lead outreach to local members, organize events and political actions, and address grievances.

Course Assistant (PHYS 1025Q) January - June 2024
Teaching Assistant (PHYS 1502Q) January - June 2022
Teaching Assistant (PHYS 1401Q) August 2021 - January 2022
UConn Physics Department

Led lab sections, assisted lectures, and maintained office hours for introductory astronomy and introductory physics classes.

Organizing Member August 2022 - June 2024
UConn Astrophysics Seminar Committee

Invited speakers and organized weekly seminars for the UConn Astrophysics community.

Organizing Member August 2021 - July 2022
UConn Astronomy on Tap

Helped organize the first Astronomy on Tap events in Connecticut. Gave a talk on "Historical Astronomy Through the Ages" to a public audience of 30+.

Organizing Member September 2017 - June 2020
UChicago Society for Physics Students

Helped run events including the 2020 Conference for Undergraduate Women in Physics (CUWiP).

Successful Proposals and Observing Experience

Atacama Large Millimeter Array
PI on 22.3 + 44.9 + 79.7-hour (12m + 7m + TP) awarded proposal for Cycle 11, "Revealing the vertical structure of molecular gas in a nearby Milky Way analog."

Co-I on 38.6 + 73.3 + 67.5-hour (12m + 7m + TP) awarded proposal for Cycles 10 and 11, "Linking Molecular Cloud Structure to Massive Star Formation: 5000 molecular clouds, filaments, and bubbles across M33."

James Webb Space Telescope
Co-I on 149.2-hour awarded proposal for Cycle 2, "A JWST Census of the Local Galaxy Population: Anchoring the Physics of the Matter Cycle."

Co-I on 22.6-hour awarded proposal for Cycle 2, "Resolving HII Regions and ISM Structure Across the Milky Way Analog NGC 253."

Submillimeter Array
Co-I on 50-hour awarded proposal for the 2022A semester, "Measuring the dust and B-field structure in M33's massive GMCs."

IRAM 30-meter telescope
Co-I on 16.4-hour proposal, "Resolved CO Observations in M31: Connecting GMCs to Diffuse Molecular Gas, continued." Executed observations at the telescope on February 3 - 6, 2023.

Schools and Technical Skills

IMPRS Heidelberg September 4 - 8, 2023
Participant in the 18$^{\text{th}}$ IMPRS Heidelberg Summer School on "Unraveling Galaxy Evolution with JWST."

GISM2 Summer School July 25 - August 2, 2023
Participant in the 2$^{\text{nd}}$ International Summer School on Galaxies and the ISM.

National Radio Astronomy Observatory (NRAO) June 13 - 21, 2023
Participant in the 19$^{\text{th}}$ NRAO Synthesis Imaging Workshop.

Submillimeter Array (SMA) January 18 - 22, 2022
Participant in the 2022 SMA Interferometry School, awarded and executed one hour of observations for the proposal "First detection of molecular cloud-scale dust continuum emission in M33".

Institut de Radioastronomie Millimétrique (IRAM) November 15 - 23, 2021
Participant in the 10$^{\text{th}}$ IRAM 30-meter School on Millimetre Astronomy.

Programming: Proficient in Python, C, ROOT, Linux systems, Java, HTML.

Software: Proficient with CASA, IRAF, SAOImage DS9, DAOPHOT/ALLSTAR. Familiar with high-performance computing (Bridges-2, UConn TACC).

Languages & Citizenship

Languages: Native English, Advanced German (C1), Conversational French (B1)

Citizen of the United States & Switzerland