

CURRICULUM VITÆ  
**GOURAV KHULLAR**

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CONTACT INFORMATION     Allen 308, Allen Hall  
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EMPLOYMENT     **Samuel P. Langley PITT PACC Astrophysics Postdoctoral Fellow,** *2022-*  
Pittsburgh Particle Physics, Astrophysics and Cosmology Center (PITT PACC), &  
Dept. of Physics and Astronomy,  
**University of Pittsburgh,** Pittsburgh, PA, USA

EDUCATION &     Ph.D., Astronomy & Astrophysics *May 2022*  
EXPERIENCE     **University of Chicago,** Chicago, IL, USA  
*URA Scholar, Radix Fellow, Jerry Rao Fellow*

- Thesis: *Star Formation Histories in Galaxy Clusters and High-Redshift Lensed Galaxies*
- Advisor: Michael D. Gladders

Visiting Student, Kavli MIT *2021-present*  
**Massachusetts Institute of Technology,** Cambridge, MA, USA  
(Mentor: Michael McDonald)

Masters of Science, Astronomy & Astrophysics *2015-2017*  
**University of Chicago,** Chicago, IL, USA

Masters of Advanced Study (MASt.) in Astrophysics *2014-15*  
**University of Cambridge,** Institute of Astronomy, Cambridge, UK  
*INLAKS Fellow at Fitzwilliam College*

- Thesis: *Characterizing AGN and host galaxies in the Dark Energy Survey*
- Advisor: Richard McMahon

*Erasmus Mundus Fellow, Student Exchange Program* *2014*  
**Aalto University** Helsinki, Finland  
Dept. of Physics and Metsahovi Radio Observatory

Bachelor of Technology (B.Tech.), Engineering Physics *2010-2014*  
**Indian Institute of Technology Delhi (IITD)** New Delhi, India

- Thesis: *Stellar Speckle Interferometry and Adaptive Optics*
- Advisor: Kedar Khare

HONORS &     • University Research Association (URA) Visiting Scholars Program, Fermilab *2020, 2021-22*  
AWARDS     • Physical Sciences Teaching Prize, University of Chicago *2020-21*  
• Radix Fellow, Physical Sciences Division, University of Chicago *2020*  
• Graduate Student Leadership Award, University of Chicago *2018, 2021*  
• Jerry Rao Fellowship, University of Chicago *2015 - 2016*  
• Finalist, Graduate Teaching Assistant Award, University of Chicago *2016*  
• Brinson Fellowship, University of Chicago *2015*  
• INLAKS Foundation Scholarship, University of Cambridge, UK *2014-15*  
• Erasmus Mundus Scholarship, Aalto University, Finland *2014*  
• Outstanding Contribution Award, Co-Curricular and Academic Activities, IIT Delhi *2013*  
• Semester Excellence Awards, IIT Delhi *2011, 2012, 2013*

PRESENTATIONS

*Invited Talks*

- STSci Galaxy Lunch Dec 2021
- NOIRLab Scientific Lunch Nov 2021
- Harvard Galaxy Clusters Meeting Nov 2021
- UT Austin Extragalactic Astronomy/Cosmology Seminar Series Nov 2021
- Yale Galaxy Lunch Nov 2021
- University of Pittsburgh Lunch Nov 2021
- MIT Kavli Brown Bag Lunch Oct 2021
- Stanford KIPAC Tea Oct 2021
- STSci Science Coffee Oct 2021
- High Redshift Galaxy Evolution Meeting, Harvard CfA Oct 2021
- Institute for Astronomy, UHawaii Sep 2021
- University of Massachusetts Amherst Galaxy Lunch Apr 2021
- University of Michigan Astronomy Galaxy Meeting Oct 2020

*Conference Talks*

- KIAA Forum on Gas in Galaxies for Early Career Scientists Nov 2021
- Spatially Resolved Spectroscopy with Extremely Large Telescopes (recorded) Sep 2021
- Multi-Object Spectroscopy for Statistical Measures of Galaxy Evolution (lightning) May 2021
- COOL-LAMPS Collaboration Meeting June 2021
- 237th American Astronomical Society Meeting : Characterizing the brightest known galaxy in the redshift  $> 5$  Universe Jan 2021
- 237th American Astronomical Society Meeting : COOL-LAMPS Collaboration, A proposed model for inclusive undergraduate teaching and research Jan 2021
- Galaxy Formation and Evolution in the Era of Roman Space Telescope (Talk) Oct 2020
- South Pole Telescope Clusters Collaboration Meeting 2017-21
- Sloan Giant Arcs Survey Collaboration Meetings 2018,2019
- University of Chicago Astronomy Chalk Talk Mar 2019
- 232nd American Astronomical Society Meeting June 2018
- Dark Energy Survey Collaboration Meeting June 2017

*Poster Presentations*

- Multi-Object Spectroscopy for Statistical Measures of Galaxy Evolution May 2021
- 232nd American Astronomical Society Meeting June 2018
- 228th American Astronomical Society Meeting June 2016

TELESCOPE  
OBSERVING

*49 nights of observing experience*

- Magellan Telescopes - LDSS3, IMACS, FIRE, FOURSTAR, MIKE (33 nights) 2016-21
- Nordic Optical Telescope - ALFOSC (5 nights) 2019-21
- McDonald Observatory - VIRUS-P (3 nights) 2021
- CTIO/Blanco Telescope - DECaM (7 nights, Dark Energy Survey) 2017
- Himalayan Chandra Telescope, Indian Insitute of Astrophysics (1 night) 2012

TELESCOPE  
PROPOSALS

- **JWST - Cycle 1 GO 2566 - PI: Khullar** - Characterizing Stellar Mass Assembly and Physical Properties in the Brightest Galaxy in the Redshift  $> 5$  Universe 20.0 hours
- **JWST - Cycle 1 GO 2555 - PI: Rivera-Thorsen, Co-I: Khullar** - How Do Ionizing Photons Escape the Sunburst Arc? 24.2 hours
- HST - Cycle 30, SNAP 17110 - PI: Setton, **Co-I: Khullar** - Post-starbursts from DESI: Timing quenching and morphological transformation at  $1 < z < 1.3$  409 orbits
- HST - Cycle 28 - PI: Dahle, **Co-I: Khullar** - A bright arc behind an extreme cluster lens at  $z = 1.5$  3 orbits
- HST - Cycle 25, SNAP 15307 - PI: Gladders, **Co-I: Khullar** - Building the SPT-HST Legacy: Imaging Massive Clusters to  $z = 1.5$  115 orbits

- Gemini-N and Gemini-S Fast Turnaround program **PI: Khullar** - GMOS Spectroscopic follow-up of COOL-LAMPS early type galaxies *2 nights, 2021*
- **Co-I: Khullar** - Magellan (LDSS3, IMACS, FOURSTAR and FIRE) observations of high-redshift gravitationally lensed galaxies *6 nights, 2020,2021*
- **PI: Khullar** - Magellan/PISCO *griz* observations of SPT galaxy clusters *2 nights*
- Co-I: Khullar - Magellan/LDSS3 spectra observations, high-redshift DES clusters *2 nights*

DIVERSITY,  
EQUITY &  
INCLUSION,  
AND OUTREACH

- **Co-founder, IDEA (Inclusion, Diversity, and Equity in Astronomy)** *2017 - present*
  - Grassroots collective for early-career astronomers at The University of Chicago
  - Has been extremely successful in building community in ECRs, conducting peer-education on equity, inclusion and justice issues, and advocating for low-barrier high impact projects that make the UChicago community more equitable, inclusive and welcoming.
  - Bi-weekly meetings for graduate students and postdoctoral researchers.
  - Organized EDI conferences - IDEA Week and IDEA Day, with talks by experts on mental health, increasing visibility of Black astrophysicists, and supporting first-generation low-income astrophysicists in undergraduate courses, and workshops on inclusive pedagogy. *2019, 2020*
  - Established a mentoring program and guaranteed relocation support for incoming students.
  - Galvanized community effort via an ensemble of working groups towards anti-racist policy-making at UChicago Astronomy and Astrophysics. *2020-present*
  - Received > \$12000 in grant funding, via:
    - UChicago Inclusive Pedagogy Grants
    - UChicago Physical Sciences Division Climate Grant
    - National Science Policy Network DICE Grant
    - UChicago Grad Council Community Wellness Fund
- Astrobites, the astro-ph reader's digest
  - Ombudsperson *2021-22*
  - Chair, AAS matters *2020-21*
  - Co-chair of Administration Committee *2019-20*
  - Media Intern, 232nd AAS Meeting, American Astronomical Society *2018*
  - Co-chair of Diversity Committee *2017-18*
  - Workshop Coordinator for Astrobites in the Classroom Study *2018-19*
  - **Writer for Astrobites** *2016-21*
- Astronomy Conversations Presenter at Adler Planetarium *2015 - 2020*
- **Teaching Race in the Core** - Race and Pedagogy Working Group Workshop, UChicago *2018*
- Founding Member of Astronomy on Tap Chicago *2015 - 2017*
- Speaker, Undergraduate Journal Club, Institute of Astronomy, Cambridge *2015*
- Cubs, Brownies and Scouts Outreach, Institute of Astronomy, Cambridge *2015*
- Outreach Speaker, Galaxy formation simulations, Radio astronomy, IIT Delhi *2012,2013*
- Organizer and Co-founder, AstroWeek, IIT Delhi's astronomy outreach festival *2012,2013*

PROFESSIONAL  
SERVICE &  
LEADERSHIP

Founding Member, the COOL-LAMPS collaboration — Chicago  
Optically-selected strong Lenses – Located At the Margins of Public Surveys *2019-present*

*Department and University Committees*

- Equity and Inclusion Council, A&A, UChicago *2016-2019*
- Dean's Student Advisory Committee, UChicago *2015-2017*
- Teaching Committee and Student Representative, IoA, University of Cambridge *2014-2015*
- Academic Affairs Officer, Fitzwilliam College, University of Cambridge *2014-2015*
- President, Astronomy Club, Indian Institute of Technology Delhi *2012-2013*
- Physics Representative, Academic Committee, IIT Delhi *2012-2013*

*Collaboration Meetings, Workshops and Seminars Organized*

- COOL-LAMPS Collaboration Meeting 2021
- UChicago Strong Gravitational Lensing Discussion Group 2018-19
- Shared Leadership and Consensus Building towards Equity and Inclusion 2021
- IDEA (Inclusion, Diversity, and Equity in Astronomy) Week 2020
- Starting Equity and Social Justice Conversations in your STEM Community, National Science Policy Network 2019
- IDEA (Inclusion, Diversity, and Equity in Astronomy) Day 2019

## TEACHING AND MENTORING

### *Lead Instructor*

#### *University of Chicago*

- ASTR 11901 94: Physics of Stars, UChicago Immersion Program Summer 2018

### *Teaching Assistant, Graduate Mentor, and Co-Instructor* Winter-Summer 2020-2021

- ASTR 29001 & 29002 Field Course in Astronomy and Astrophysics, University of Chicago
- ChicagO Optically-selected strong Lenses – Located At the Margins of Public Surveys (COOL-LAMPS) Collaboration (PI: Michael D Gladders)
- Mentored 19 undergraduate students, including (most recent known affiliation)
  - Katya Gozman (Graduate student, University of Michigan)
  - Ezra Sukay (Researcher, SLAC)
  - Owen Matthews Acuña (Researcher, Gladders Group and COOL-LAMPS)
  - Jorge Sanchez (Graduate student, New Mexico State University)
  - Michael Martinez (Graduate student, University of Wisconsin Madison)
  - Erik Zaborowski (Graduate student, Ohio State University)
  - Ben Levine (Undergraduate student, UChicago)
  - Viraj Manwadekar (Undergraduate student, UChicago)
  - Sebastian Fernandez-Mulligan (Graduate, University of Chicago, 2018)
  - Hadia Tarik (High School Student, Physics of Stars, UChicago, 2018)

### *Guest Lecturer*

#### *University of Chicago*

- ASTR 11901 94: Physics of Stars 2017-2021
- Yerkes Summer Institute, Space Explorers Program 2016-2019

#### *Indian Institute of Technology Delhi*

- Astronomy Club 2014-2015

### *Teaching Assistant*

#### *University of Chicago*

- ASTR018200: The Origin and Evolution of the Universe Winter 2018
- PHSC12700: Stars Fall 2015
- PHSC12710: Galaxies Winter 2016
- PHSC12720: Exoplanets Spring 2016
- ASTR 18800: Philosophical Problems in Cosmology Spring 2018

### *Teaching Consultant*

#### *University of Chicago*

- ASTR 11901 94: Physics of Stars 2019-2021

## PUBLIC PRESS

- UChicago undergrads discover bright lensed galaxy in the early universe, UChicago News
- James Webb Space Telescope to offer humanity an unprecedented look at the Universe, UChicago News
- University Of Chicago Astrophysics Students Discover Galaxy Dating Back To Early Universe, CBS Chicago
- Graduate students recognized for exceptional teaching of undergraduates, UChicago
- PSD climate grants foster belonging while socially distanced, Physical Sciences Division, UChicago

- Starts With a Bang Podcast with Ethan Siegel
- Expand Your Perspective Podcast, Ep 1: The Universe: Black Holes, Exoplanets, and the Evolution of Stars, UChicago
- Astronomers use giant galaxy cluster as X-ray magnifying lens, UChicago News
- Astrobites White Paper, Women in Astronomy Blog
- U-M researchers confirm massive hyper-runaway star ejected from the Milky Way Disk, Michigan News
- The Physics of Toys, Yerkes Summer Institute, KICP, University of Chicago
- Spy vs. Spy, Yerkes Summer Institute, KICP, University of Chicago

#### WORKSHOPS

- JWST Webbinar, NIRSpec IFU Data Analysis *2021*
- .AstroX Conference, STScI, Baltimore *2018*
- Data Visualization and Exploration in the LSST Era Workshop, NCSA, Urbana-Champaign *2018*
- SACNAS Midwest Meeting, University of Chicago *2018*
- Using Python to Search NASA's Astrophysics Archives (Remote), IPAC *2018*
- ALMA Proposal Workshop, Northwestern University and NRAO *2018*
- ComSciCon Chicago Science Outreach Workshop, *2017*
- Future Cosmic Surveys Workshop, University of Chicago *2016*
- CMB-S4 Meeting, University of Chicago *2016*
- Cosmology Using Low Resolution Spectroscopy in 2020s, University of Chicago *2016*
- World Wide Telescope Developer Workshop *2015*
- AstroStatistics Workshop, Royal Statistical Society, London *2014*
- Radio Astronomy Winter School, NCRA and Inter-University Centre for Astronomy and Astrophysics (IUCAA), India *2012*
- Workshop on Cosmology, Inter-University Centre for Astronomy and Astrophysics (IUCAA), India *2012*

*Publications with significant contribution*

- [1] **Khullar, G.**, Nord, B., Ciprianovic, A et al. 2022, "*DIGS: Deep Inference of Galaxy Spectra with Neural Posterior Estimation*": **Accepted Manuscript**
- [2] **Khullar, G.**, Bayliss, M.B., Gladders, M.D., et al. 2022, "*Synthesizing Stellar Populations in South Pole Telescope Galaxy Clusters: I. Measuring the Ages of Quiescent Members in the SPT-GMOS and SPT Hi-z Clusters*": **arXiv:2111.09318**
- [3] **Khullar, G.**, Gozman, K., [...], Gladders, M.D., Rigby, J.R., Sharon, K., et al., "*COOL-LAMPS. I. An Extraordinarily Bright Lensed Galaxy at Redshift 5.04*" 2021, ApJ, 906, 107, ADS
- [4] **Khullar, G.**, Bleem, L.E., Bayliss, M.B., Gladders, M.D., et al. "*Spectroscopic Confirmation of Five Galaxy Clusters at  $z > 1.25$  in the 2500 sq. deg. SPT-SZ Survey*" 2019, ApJ, 870, 7, ADS
- [5] **Khullar, G.**, Gladders, M.D., Rigby, J.R., Sharon, K., et al., "*COOL-LAMPS VI. Characterizing the Size-Mass Relation in Gravitationally Lensed Early-Type Galaxies at  $z \sim 1$* " in prep
- [6] Yu-Yang Hsiao, T., Coe, D., Abdurrouf, [...] **Khullar, G.** et al. 2022, "*JWST reveals a possible  $z \sim 11$  galaxy merger in triply-lensed MACS0647JD*": arXiv:2210.14123
- [7] Sukay, E., **Khullar, G.**, [...], Gladders, M.D., Rigby, J.R., Sharon, K., et al. 2022, "*COOL-LAMPS. II. Characterizing the Size and Star Formation History of a Bright Strongly Lensed Early-Type Galaxy at Redshift 1*", (Accepted in ApJ).
- [8] Florian, M.K., Rigby, J.R., [...] **Khullar, G.** et al., "Spatial Variation in Strong Line Ratios and Physical Conditions in Two Strongly Lensed Galaxies at  $z \sim 1.4$ ", 2021, ApJ, 916,50, ADS
- [9] Strazzullo, V., Pannella, M., Mohr, J.J., [...], **Khullar, G.** et al., "*Galaxy populations in the most distant SPT-SZ clusters - I. Environmental quenching in massive clusters at  $1.4 < z < 1.7$* ", 2019, AA, 622, A117, ADS
- [10] Hattori, K., Valluri, Monica, [...] and **Khullar, G.**, "*Origin of a Massive Hyper-runaway Subgiant Star LAMOST-HVS1: Implication from Gaia and Follow-up Spectroscopy*" 2019, ApJ, 873, 116, ADS
- [11] **Khullar G.**, Kohler, S., Konchady, T., et al. 2019, "*Astrobites as a Community-led Model for Education, Science Communication, and Accessibility in Astrophysics*", 2020 Decadal Survey on Astronomy and Astrophysics, arXiv:1907.09496

*Co-Authored Publications*

- [12] Ghirardini, V., Bulbul, E., [...], **Khullar, G.**, "*Evolution of the Thermodynamic Properties of Clusters of Galaxies out to Redshift of 1.8*", 2021, ApJ, 910, 1, ADS
- [13] Armus, L., Megeath, S.T., [...], **Khullar, G.** et al., "*Great Observatories: The Past and Future of Panchromatic Astrophysics*", 2021, 2020 Decadal Survey on Astronomy and Astrophysics, arXiv:2104.00023
- [14] Ruppin, F., McDonald, M., [...], **Khullar, G.**, et al. 2020, "*Stability of Cool Cores During Galaxy Cluster Growth: A Joint Chandra/SPT Analysis of 67 Galaxy Clusters Along a Common Evolutionary Track Spanning 9 Gyr*", ADS
- [15] Bayliss, M.B., McDonald, M., Sharon, K., Gladders, M.D., [...], **Khullar, G.**, "*An X-ray Detection of Star Formation In a Highly Magnified Giant Arc*", 2020, Nature Astronomy, Volume 4, 159, ADS
- [16] Bleem, L.E., Bocquet, S., Stalder, B., Gladders, M.D., [...] **Khullar, G.** et al., "*The SPTpol Extended Cluster Survey*" 2020, ApJS, 247, 25, ADS

- [17] Huang, N., Bleem, L.E., Stalder, B., [...] **Khullar, G.** et al., "*Galaxy Clusters Selected via the Sunyaev-Zel'dovich Effect in the SPTpol 100-Square-Degree Survey*" 2020, AJ, 159, 110, ADS
- [18] Mahler, G., Sharon, K., Gladders, M.D., [...], **Khullar, G.**, "*Strong Lensing Model of SPT-CLJ0356-5337, a Major Merger Candidate at Redshift 1.0359*", 2019, ApJ, 894, 150, ADS
- [19] Bocquet, S., Dietrich, J.P., Schrabback, T., Bleem, L.E., [...] **Khullar, G.** et al., "*Cluster Cosmology Constraints from the 2500 deg<sup>2</sup> SPT-SZ Survey: Inclusion of Weak Gravitational Lensing Data from Magellan and the Hubble Space Telescope*" 2019, ApJ, 878, 55, ADS
- [20] McDonald, M., Allen, S.W., [...] **Khullar, G.** et al., "*A Detailed Study of the Most Relaxed SPT-Selected Galaxy Clusters: Cool Core and Central Galaxy Properties*" 2019, ApJ, 870, 85, ADS
- [21] Bulbul, E., Chiu, I., Mohr, J.J., [...] **Khullar, G.** et al., "*X-ray Properties of SPT Selected Galaxy Clusters at  $0.2 < z < 1.5$  Observed with XMM-Newton*" 2019, ApJ, 871, 50, ADS
- [22] Abbott, T. M. C., Allam, S., [...], **Khullar, G.**, et al. "*The Dark Energy Survey Data Release 1*" 2018, ApJS, 239, 18, ADS

**Complete NASA ADS Publication Record**

REFERENCES Prof. Michael D Gladders  
**University of Chicago**, Chicago, IL, USA  
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Prof. Rachel Bezanson  
**University of Pittsburgh**, Pittsburgh, PA, USA  
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Dr. Jane R Rigby  
**NASA Goddard Space Flight Center**, Greenbelt, MD, USA  
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Prof. Matthew B Bayliss  
**University of Cincinnati**, Cincinnati, Ohio, USA  
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