Madeline Lucey

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RESEARCH INTERESTS

Galactic archaeology, near-field cosmology, population II stars, the Galactic bulge, carbon-enhanced metal-poor stars, red clump stars, stellar evolution, stellar spectroscopy, data mining and machine learning

EDUCATION

The University of Texas at Austin *August 2018 - Present*
Ph.D. Astronomy
Thesis: Uncovering Galactic Fossils from the Early Universe
Advisor: Keith Hawkins

Colorado College *May 2018*
Bachelor of Arts in Physics: Astrophysics Emphasis
Overall GPA: 3.80, Major GPA: 3.94, Magna Cum Laude

PUBLICATIONS

4. **M. Lucey**, Y.-S. Ting, N. Ramachandra, K. Hawkins, *Selecting a Pristine Sample of 4.2 Million Red Clump Stars*, 2019, MNRAS, In prep., exp. submission Jan 2020

   In this work, I select red clump stars from the $\sim$ 200 million stars which have photometry from 2MASS, AllWISE, *Gaia*, and Pan-STARRS. I do this by inferring the effective temperature, surface gravity, and the asteroseismic parameters (period spacing and frequency separation) using a Mixture Density network. This is the largest and most $\sim$1 million stars at distances $>$ 10 kpc.

3. K. Hawkins, **M. Lucey**, Y.-S. Ting, A. Ji, D. Katzberg, M. Thompson, K. El-Badry, J. Teske, T. Nelson , A. Carrillo, *Identical or fraternal twins? : The chemical homogeneity of wide binaries from Gaia DR2*, 2019, MNRAS, Accepted

2. **M. Lucey**, K. Hawkins, M. Ness, M. Asplund, T. Bensby, L. Casagrande, S. Feltzing, K.C. Freeman, C. Kobayashi, A.F. Marino, *The COMBS survey I: The Chemical Origins of Metal-Poor Stars in the Galactic Bulge*, 2019, MNRAS, 488, 2283

   This paper is the first part of the Chemical Origins of Metal-poor Bulge Stars (COMBS) survey that will chemo-dynamically characterize the metal-poor bulge population. In this work, I determined the stellar parameters of 26 stars and their elemental abundances for 22 elements using R$\sim$ 47,000 VLT/UVES spectra and contrast their elemental properties with that of other Galactic stellar populations. I found that the elemental abundances we derive for our metal-poor bulge stars have lower overall scatter than typically found in the halo. This indicates that these stars may be a distinct bulge population.

1. B. Pope, G. Davies, K. Hawkins, T. White, A. Stokholm, A. Bieryla, D. Latham, **M. Lucey**, C. Aerts, S. Aigrain, V. Antoci, T. Bedding, D. Bowman, A. Chontos, G. Esquerdo, D. Huber, P. Jofré, S. Murphy, T. van Reeth, V. Aguirre, J. Yu, *The Kepler Smear Campaign I: An Asteroseismic Catalogue of Bright Red Giants*, 2019, ApJ, 244, 18

AWARDS AND FELLOWSHIPS

Frank N. Edmonds, Jr. Memorial Fellowship in Astronomy	2019
Kavli Summer Program in Astrophysics Fellow	2019
David and Karen Smith Cowperthwaite Award for Excellence in Physics	2018
Deans List	2015-2018
Nominated for Euclid Scholarship	2016
National Merit Scholarship Finalist	2012

AWARDED TELESCOPE TIME

PI: McDonald Obs. 2.7m, 6 nights	2019
→*Chemically Characterizing a Newly Discovered Stellar Stream*	
Co-I: McDonald Obs. 2.7m, 6 nights (PI:Andreia Carrillo)	2019
→*Detailed chemical abundances of Gaia-Enceladus stars*	
Co-I: McDonald Obs. 2.7m, 5 nights (PI:Keith Hawkins)	2018
→*The Chemical Homogeneity of Wide Binaries in Gaia DR2*	
Co-I: WIYN 3.5m, 4 nights (PI:Natalie Gosnell)	2018
→*Clusters with K2: systematics from membership and binarity*	

OBSERVING EXPERIENCE

McDonald Obs, Tull spectrograph - 17 nights	2018, 2019
WIYN, Hydra Multi-Fiber Spectrograph 1 night	2018

TEACHING EXPERIENCE

Teaching Assistant	
Introductory Astronomy	Fall & Spring 2019
Learning Assistant	
Introductory Physics I & II	2015−2018
Tutoring	
Math and Physics Department	2015−2018

NOTABLE PRESENTATIONS

<u>Invited Talks</u>

Board of Visitors Meeting, University of Texas at Austin, *Uncovering Galactic Fossils from the Early Universe*, 2019

Colorado College Across the Country: Change-makers Who are Defining the CC Experience, *Astronomy in Thailand: Inspiring Young Scientists*, 2018

Colorado College Venture Grant Forum, *Astronomy in Thailand: Inspiring Young Scientists*, 2017

<u>Poster Presentations</u>

Frank N. Bash Symposium *Identifying Red Clumps stars with a Mixed Density Network*, 2019

American Astronomical Society Meeting Abstracts, 231, *Cataloging the Praesepe Cluster: Identifying Interlopers and Binary Systems* 2018

Colorado College Summer Collaborative Research Experience Symposium, *Cataloging the Praesepe Cluster: Identifying Interlopers and Binary Systems*, 2017

<u>Seminars</u>

Kavli Summer Program in Astrophysics, *Declumping the Red Clump*, 2019

University of Texas at Austin, *The COMBS Survey*, 2019

Senior Thesis Presentation, *Cataloging the Praesepe Cluster*, 2018

COMMUNITY ENGAGEMENT

GUMMY, Graduate Mentor	Jan 2018−Present
Astronomy on Tap ATX, Social Media Coordinator	May 2018−Present
AWARE, University of Texas at Austin	Sept 2018−Present
Girl Day, University of Texas at Austin	February 2019
Women in STEM, Colorado College	Jan 2017−May 2018
Astronomy in Thailand: Inspiring Young Scientists,	Oct 2016−Jan 2017

COMPUTING SKILLS

Languages: Python, IDL, SQL/ADQL, LaTex, bash/shell, git
Packages: TensorFlow, Pytorch, Scikit learn, Pandas
Software: BACCHUS, IRAF, TOPCAT, iSpec, SME