Dr. Rachel Smullen

Scientist 2
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Employment

2021-present **Los Alamos National Laboratory**, *Scientist 2*

2020-2021 **Los Alamos National Laboratory**, *Metropolis Postdoctoral Fellow*

Education

2020 **University of Arizona**, *PhD in Astronomy & Astrophysics*
"The Formation and Early Evolution of Binaries and Their Environments"

2016 **University of Arizona**, *MS in Astronomy*

2014 **University of Wyoming**, *B.S. in Physics & B.S in Astronomy*
Minors in Mathematics, Computer Science, Interdisciplinary Computational Science
Graduated *summa cum laude*; Member of Honors Program

Recent Fellowships, Awards, and Honors

2022 LAAP Award

2020 Metropolis Postdoctoral Fellowship

2020 NSF Postdoctoral Fellowship (Declined)

2019-2020 Jamieson Graduate Fellowship

2017 Department of Astronomy Outstanding Scholarship Award

2017 P.E.O. Scholar Award

2015-2019 National Science Foundation Graduate Research Fellowship

Publications

As First Author

Smullen, R. A. & Ayyalapu, N.[†], *(MNRAS under review)* "A machine learns to predict instability in highly diverse planetary systems"

Smullen, R. A., Kratter, K. M., Offner, S. S. R., Lee, A. T., & Chen, H. H., 2020, MNRAS, 497, 4517 "The Highly Variable Time Evolution of Star-forming Cores Identified with Dendrograms"

Smullen, R. A. & Volk, K., 2020, MNRAS, 97, 1391 "Machine Learning Classification of Kuiper Belt Populations"

Smullen, R. A. & Kratter, K. M., 2017, MNRAS, 466, 4480 "The Fate of Debris in the Pluto-Charon System"

Smullen, R. A., Kratter, K. M., & Shannon, A. 2016, MNRAS, 461, 1288 "Planet Scattering Around Binaries: Ejections, Not Collisions"

Smullen, R. A., Kobulnicky, H. A. 2015, ApJ, 808, 166 "Heartbeat Stars: Orbital Solutions for Eccentric Binary Systems"

As Co-author

Galloway-Sprietsma, M.[†], Shirley, Y. L. et al. 2022, MNRAS, 515, 5219 "A Survey of Deuterated Ammonia in the Cepheus Star-Forming Region L1251"

Lee, A. T., Offner, S. S. R., Kratter, K. M., **Smullen, R. A.**, & Li, P. S., 2019, ApJ, 887, 232 "The Formation and Evolution of Wide-Orbit Stellar Multiples In Magnetized Clouds"

Kobulnicky, H. A., Kiminki, D. C. et al. 2014, ApJS, 213, 34 "Toward Complete Statistics of Massive Binary Stars: Penultimate Results from the Cygnus OB2 Radial Velocity Survey"

Kobulnicky, H. A., **Smullen, R. A.**, Kiminki, D. C., et al. 2012, ApJ, 756, 50 "A Fresh Catch of Massive Binaries in the Cygnus OB2 Association"

In Preparation

Smullen, R. A., Offner, S. S. R., & Kratter, K. M., *(MNRAS in prep)* "Core evolution identified by dendrograms in synthetic observations"

† *Student*

Recent Training and Related Experience

Salishan Conference on High Speed Computing	*Spring 2021, Spring 2022*
Nuclear Fundamentals Orientation Module 2	*Summer 2021*
Nuclear Fundamentals Orientation Module 1	*Spring 2021*

Advising and Teaching

LANL co-mentor for post-bacc B. Pena	*Jan 2023–present*
Mentoring high school student N. Ayyalapu on LANL research project	*Fall 2020–present*
Co-mentored UA undergraduate T. Smith on honors thesis	*Fall 2018–Spring 2020*
TA for ASTR 208 (Energy, Society, and the Environment)	*Spring 2018*
ATOMM Tutor (Tutoring for astronomy majors and minors)	*Fall 2017–Spring 2018, Spring 2020*
TA for ASTR 300A (Dynamics and Mechanics in Astrophysics)	*Fall 2017*

Selected Presentations

Contributed Conference Talks

2021	Seeing is Believing?	*UA-LANL Days, Virtual*
2020	The Time Evolution of Star-forming Cores (Dissertation Talk)	*AAS 235, Honolulu, HI*
2019	The Highly Variable Time Evolution of Cores	*EWASS 2019, Lyon, France*
2019	The Highly Variable Time Evolution of Cores	*Zooming in on Star Formation, Nafplio, Greece*
2016	The Fate of Debris in the Pluto-Charon System	*DDA Meeting, Nashville, TN*
2015	The Architecture of Circumbinary Systems	*Extreme Solar Systems III, Waikoloa, HI*

Invited Talks

Fall 2019	What We Learn from Binaries at All Scales	*UT Austin Cosmos Seminar*

Local Talks

Winter 2021	Seeing is Believing?	*Agnew & Metropolis Showcase*
Fall 2020	Machine Learning in the Kuiper Belt	*CTA Friday Meeting*
Spring 2020	Machine Learning Classification of Kuiper Belt Populations	*Women in Data Science–Tucson 2020*
Spring 2020	A (Practical) Introduction to UA HPC	*SO Astro Code Donuts*
Fall 2018	OpenACC: How To Accelerate Your Code in Under 10 Lines	*SO Code Coffee*
Fall 2017	Python + Joblib: Make Your Computer Work Harder, and Save Yourself Time	*SO Code Coffee*
Fall 2017	An Intro to Machine Learning	*SO Code Coffee*
Fall 2017	UA High Performance Computing Resources	*SO Code Coffee*
Fall 2017	Hierarchical Structures in Star Formation Simulations	*SO Internal Symposium*
Summer 2017	Hierarchical Structures in Star Formation Simulations	*MPIA Coffee*
Fall 2016	The Fate of Debris in the Pluto-Charon System	*SO Internal Symposium*
Spring 2015	The Architecture of Circumbinary Systems	*SO Internal Symposium*

Posters

2020	Machine Learning Classification of Kuiper Belt Populations	*PIML 2020, Santa Fe, NM*
2019	The Highly Variable Time Evolution of Cores	*From Stars to Planets II, Gothenburg, Sweden*
2018	Hierarchical Structures in Star Formation Simulations	*IHPCSS, Ostrava, Czech Republic*
2018	Hierarchical Structures in Star Formation Simulations	*SPF 2, Biosphere 2, AZ*
2015	The Architecture of Circumbinary Systems	*Sagan Workshop, Pasadena, CA*
2015	The Architecture of Circumbinary Systems	*SPF 1, Biosphere 2, AZ*

Selected Service and Outreach

Organizational and Academic Service

X-Division LDRD POC	*January 2023–present*
CTA Deputy Director	*Dec 2022–present*
CSES Astrophysics Assessor	*Fall 2021, 2022*
LDRD ER Panel Reviewer	*Summer 2022*
Women of Computing Summer STEAM Spotlight Series co-organizer	*Summer 2021, 2022*
CTA Journal Club co-host	*Fall 2020–present*
Referee for MNRAS	*2018–present*
Prospective graduate student visit co-organizer (17 students; 3 day visit)	*Spring 2017*
Colloquium lunch organizer	*2016–2018*

Diversity, Community, and Outreach

NSS Diversity Issue	*Winter 2022*
Women of Computing Summer STEAM Spotlight Series Speaker	*Summer 2021*
LANL 2021 Summer Physics Camp for Young Women Presenter	*Summer 2021*
NMHS Stellar Alumni Webinar Speaker	*Spring 2021*
LAHS Astronomy Club Speaker	*Fall 2020, Spring 2021, Fall 2021*
LAPA Peer Coaching Group Participant	*Spring 2021–Spring 2022*
STEM Santa Fe Volunteer	*Spring 2021*
Teen Astronomy Café presentation "Breaking the Solar System (and other ways simulations help us understand the universe)"	*Summer 2020, Spring 2021*
UA WISE Mentor	*Fall 2020–Fall 2021*
PEO Chapter U and Chapter CS meeting speaker	*Spring 2018*
Teen Astronomy Café volunteer	*2017–2020*
Warrior-Scholar Project volunteer/activity developer	*Summer 2017*
Tucson Women in Astronomy (TWA) chair	*2016–2018*
TWA undergraduate mentoring organizer	*2016–2018*
Project ASTRO classroom astronomer	*2016–2018*

Professional Affiliations

LANL: Center for Theoretical Astrophysics, Women of Computing, Atomic Women, Connect ERG

Technical Skills

Languages	Python (primary), C, C++, Fortran, IDL, SQL, MATLAB
Tools	CMF, `yt`, `scikit-learn`, Jupyter, RADMC-3D, MERCURY, REBOUND, LaTeX, and lots more
Systems	Linux (Ubuntu, Red Hat, CentOS), OS-X, Windows
HPC Tools	LSF, PBS, Slurm, Globus, OpenACC, OpenMP, MPI

Updated January 22, 2023