Evan H. Anders

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Research Interests

Computational fluid dynamics and its applications to stellar interiors and atmospheres.
Interactions between stellar convection and stable layers, stratification, rotation, or magnetism.

Education

May 2020 **Ph.D.**, *University of Colorado – Boulder*, Astrophysical & Planetary Sciences.
Thesis title: "Fundamental Studies of Stratified Stellar Convection: Simulations and Theory"

Dec. 2017 **M.S.**, *University of Colorado – Boulder*, Astrophysical & Planetary Sciences.

May 2014 **B.S.**, *Whitworth University*, Physics.

Research Experience

Sept 2020- **Postdoctoral Fellow**, *CIERA, Northwestern University*, Evanston, IL.

Summer 2020 **Postdoctoral Researcher**, *LASP*, Boulder, CO.

2018-2020 **NASA NESSF Graduate Fellow**, *University of Colorado & LASP*, Boulder, CO.

2015-2018 **George Ellery Hale Graduate Fellow**, *NSO & LASP*, Boulder, CO.

Summer 2015 **Graduate Research Assistant**, *LASP*, Boulder, CO.

2013 **NSF Summer Undergraduate Research Fellow**, *LIGO*, Hanford, WA.

2012 **DOE Summer Undergraduate Laboratory Intern**, *PNNL*, Richland, WA.

Grants & Fellowships Awarded

2020-Present **CIERA Postdoctoral Fellowship**, Evanston, IL.
Fellowship covers salary and provides $15,000 yearly research stipend

2018-2020 **NASA Earth and Space Science Fellowship**, *$90,000*, Boulder, CO.
Fundamental Studies Into the Solar Convective Conundrum: Do Giant Cells Exist?
Grant Number 80NSSC18K1199

2015-2018 **NSO George Ellery Hale Graduate Fellowship**, Boulder, CO.
Fellowship covers tuition, fees, and graduate research stipend for three full years.
Fellowship overview available online at https://www.nso.edu/students/hale-fellowships/

Invited Presentations

2021 10.Stellar convective penetration: parameterized theory and dynamical simulations
Virtual. Astro coffee. The Ohio State University. Oct. 27.

9. Convective Penetration Probably Parameterizes Convective Overshoot
Virtual. Stellar Physics Group Presentation. CCA, Flatiron Institute. July 6.

8. Convective Penetration Probably Parameterizes Convective Overshoot
Virtual. Seminar. "Kavli Summer Program in Astrophysics 2021: Fluid dynamics of the Sun and stars." July 5.

7. Massive Star Variability
Virtual. Pre-recorded research intro lecture. "Kavli Summer Program in Astrophysics 2021: Fluid dynamics of the Sun and stars." June 8.

2020 6. Massive Star Variability and other fun with Dedalus
CIERA, Northwestern University. CIERA Virtual Happy Hour Short Talk. Nov. 20.

5. Entropy Rain and the Solar Convective Conundrum: Dilution and Compression of Individual Convective Downflows
Nordita, Stockholm. "The Shifting Paradigm of Stellar Convection: From Mixing Length Concepts to Realistic Turbulence Modeling" workshop. Mar. 4.

2019 4. Entropy Rain and the Solar Convective Conundrum: Dilution and Compression of Individual Convective Downflows
Princeton University. Star Formation/ISM Rendezvous (SFIR) Seminar. Dec. 4.

3. Entropy Rain: Dilution and Compression of Thermals in Stratified Domains
University of Colorado – Boulder. Applied Math Geophysical and Astrophysical Fluid Dynamics (GAFD) Seminar. Oct. 1.

2018 2. Predicting the Rossby Number in Stratified, Compressible Convection
National Solar Observatory. Solar Focus Meeting. Dec. 7.

2017 1. Fundamental studies in stratified convection at low and high Mach Number
University of Colorado – Boulder. Applied Math Dynamics Seminar. Nov. 11.

Publications List

Peer-reviewed Journal Articles

2022 14. **Anders, E.H.**; Jermyn, A.S.; Lecoanet, D.; Fraser, A.E.; Cresswell, I.G.; Joyce, M.; and Fuentes, J.R. submitted to ApJ.
Schwarzschild and Ledoux are equivalent on evolutionary timescales

13. Jermyn, A.S.; **Anders, E.H.**; Lecoanet, D.; and Cantiello, M. submitted to ApJ.
Convective Penetration in Early-Type Stars

12. Jermyn, A.S.; **Anders, E.H.**; and Cantiello, M. accepted for publication in ApJ.
A Transparent Window into Early-Type Stellar Variability

11. **Anders, E.H.**; Jermyn, A.S.; Lecoanet, D.; and Brown, B.P., ApJ 926, 169.
Stellar convective penetration: parameterized theory and dynamical simulations

2021 10. O'Connor, L.; Lecoanet, D.; and **Anders, E.H.**, Physical Review Fluids 6, 093501.
Marginally-Stable Thermal Equilibria of Rayleigh-Bénard Convection

9. Lecoanet, D.; Cantiello, M.; **Anders, E.H.**; Quataert, E.; Couston, L.; Bouffard, M.; Favier, B.; and Le Bars, M., MNRAS 508, 1, 132-143.
Surface Manifestation of Stochastically Excited Internal Gravity Waves

8. Van Kooten, S.J.; **Anders, E.H.**; and Cranmer, S.R, ApJ 913, 69
A Refined Model of Convectively-Driven Flicker in Kepler Light Curves

7. Oishi, J.S.; Burns, K.J.; Clark, S.E.; **Anders, E.H.**; Brown, B.P.; Vasil, G.M.; and Lecoanet, D, JOSS 6(62), 3079.
eigentools: A Python package for studying eigenvalueproblems with an emphasis on stability

2020 6. **Anders, E.H.**; Vasil, G.M.; Brown, B.P.; and Korre, Lydia, Physical Review Fluids 5, 083501.
Convective dynamics with mixed temperature boundary conditions: why thermal relaxation matters and how to accelerate it

2019 5. **Anders, E.H.**; Lecoanet, D.; and Brown, B.P., ApJ 884, 65.
Entropy Rain: Dilution and Compression of Thermals in Stratified Domains

4. **Anders, E.H.**; Manduca, C.M.; Brown, B.P.; Oishi, J.S.; Vasil, G.M., ApJ 872, 2.
Predicting the Rossby Number in Convective Experiments

2018 3. **Anders, E.H.**; Brown, B.P; and Oishi, J. S., Physical Review Fluids 3, 083502.
Accelerated evolution of convective simulations

2017 2. **Anders, E.H.** and Brown, B.P., Physical Review Fluids 2, 083501.
Convective heat transport in stratified atmospheres at low and high Mach number

2016 1. Karki, S.; Tuyenbayev, D.; Kandhasamy, S.; Abbott, B.P.; Abbott, T.D.; **Anders, E.H.**; Berliner, J.; Betzwieser, J.; Cahillane, C.; Canete, L.; Conley, C.; Daveloza, H.P.; De Lillo, N.; Gleason, J.R.; Goetz, E.; Izumi, K.; Kissel, J.S.; Mendell, G.; Quetschke, V; Rodruck, M.; Sachdev, S.; Sadecki, T.; Schwinberg, P.B.; Sottile, A.; Wade, M.; Weinstein, A.J., West, M.; and Savage, R.L., Review of Scientific Instruments 87, 114503.
The Advanced LIGO photon calibrators

Other Publications

2022 2. **Anders, E.H.**; Jermyn, A.S.; Lecoanet, D.; Fuentes, J.R.; Korre, L.; Brown, B.P.; Oishi, J.S.; accepted for publication in RNAAS.
Convective Boundary Mixing Processes

1. Jermyn, A.S.; **Anders, E.H.**; Lecoanet, D.; Cantiello, M.; and Goldberg, J.A.; RNAAS 6, 29.
Measures of Convective Efficiency

Awards & Honors

2019 **AAS 233 Chambliss Graduate Student Poster Contest**, *Honorable Mention*.

2016 **Comprehensive Exam II High Pass**, University of Colorado – Boulder.
Awarded for the defense of publication-quality research

2016 **Carl Hansen Graduate Fellowship**, *$1,000*, University of Colorado – Boulder.
Awarded to a graduate student studying stellar interiors

2014 **President's Award for Outstanding Academic Achievement**, Whitworth Univ..
Awarded to students graduating with 4.0 GPAs

Contributed Presentations

2021 **APS Division of Fluid Dynamics**, *Talk*, Pheonix, AZ.
Convective penetration exists and we found it

KITP Probes of Transport in Stars conference, *Talk*, Santa Barbara, CA.
Stellar Convective Penetration: Context, Theory, and Simulations

2020 **APS Division of Fluid Dynamics**, *Virtual Talk*, Chicago, IL.
Convection in the Full Sphere: Predicting the Rossby Number of Mean & Fluctuating Flows

American Astronomical Society's 235th Meeting, *Dissertation Talk*, Honolulu, HI.
Numerical Explorations in Stellar Convection

2019 **APS Division of Fluid Dynamics**, *Talk*, Seattle, WA.
Dilution and Compression of Thermals in Stratified Domains

Compressible Convection Conference, *Talk*, Newcastle Upon Tyne, UK.
Entropy Rain: Dilution and Compression of Turbulent Thermals in Stratified Domains

Stellar Hydro Days V, *Poster*, Exeter, UK.
Accelerating the evolution of atmospheric structure in convective simulations

American Astronomical Society's 233rd Meeting, *Poster*, Seattle, WA.
Accelerating the evolution of simulated convective atmospheres

2018 **APS Division of Fluid Dynamics**, *Talk*, Atlanta, GA.
Predicting the Rossby number in stratified, compressible convection

2017 **APS Division of Fluid Dynamics**, *Talk*, Denver, CO.
The effects of Mach number and rotation on heat transport in stratified convection

Compressible Convection Conference, *Talk*, Lyon, Fr.
Convective heat transport in stratified atmospheres at low and high Mach number

2016 **APS Division of Fluid Dynamics**, *Talk*, Portland, OR.
Sustained shear flows in stratified convection

AAS Solar Physics Division, *Poster*, Boulder, CO.
Boundary Layer Structure in Stratified Convection

Service

Departmental Service

2022 Member of CIERA Justice, Equity, Diversity, and Inclusion (JEDI) committee

2021 Chair of CIERA K12 outreach taskforce

2020 Member of CIERA K12 outreach taskforce
2019-2020 Member of newly-formed admissions setup committee
2018-2019 Voting member of graduate admissions committee
Graduate student member of exams committee
2017-2018 Voting member of graduate admissions committee
2016-2017 Voting member of hiring committee for director of Fiske Planetarium
Graduate student member of search committee for NSO/CU faculty appointment
Graduate student member of exams committee
2015-2016 Graduate student member of search committee for three-year NSO/CU appointment

Referee Service

JFM 2021, 1 total articles
JAS 2020-2021, 2 total articles
DIRAC 2020, 1 total grants

Referee Service

2021 One JAS article
2020 One JAS article; one DIRAC grant

Teaching Experience and Professional Development

Courses & Labs Taught

Summer 2017 **ASTR 2600: Introduction to Scientific Programming**, *Co-Instructor of Record*.
2014-2017 **ASTR 1010: Introductory Astronomy I (Lab)**, *Graduate Lab Instructor, 4 sections*.

Guest Lectures

2020 **PS361: Nuclear Physics**, *Whitworth University*, "Life and Death of Stars", Dec. 9.
2015 **ASTR 1010: Intro. Astro. I**, *Univ. of CO*, "Patterns in the Solar System", Mar. 10.

Teaching Assistantships

2015-2016 **ASTR 1010: Introductory Astronomy I**, *Lecture Teaching Assistant, 2 sections*.

Pedagogy Training

2019 **UCSC ISEE Professional Development Program**, *Design Team Leader*.
Led team over a 100-hour program to design and teach a day-long inquiry activity on buoyancy.
2017 **UCSC ISEE Professional Development Program**, *Participant*.
Designed and taught a day-long inquiry activity on exoplanet transits.
2016-2017 **Lead Graduate Teacher**, *Astro. Department*, University of Colorado, Boulder, CO.
Led video consultations, ran pedagogy workshops, interfaced with Graduate Teacher Program.

Outreach

Long-term programs

2016-2019 **CU STARs**, *Student Coordinator*, University of Colorado, Boulder, CO.
CU STARs (CU Boulder Science, Technology, and Astronomy RecruitS) visits underserved schools across all of Colorado and gives high school students an opportunity to learn about and engage with space science. Graduate students serve as mentors to undergraduates, help design and improve outreach courses, and ensure outreach visits run smoothly.

2014-2017 **Sommers-Bausch Observatory Open House Series**, *Host & Telescope Operator*, University of Colorado, Boulder, CO.
Operated telescopes and answered questions from the public during free observing nights.

Visualization & Print Media

2021 **"Exoplanets" Pathfinder Pamphlet**, CIERA Pathfinder Series, Evanston, IL.

One-day events

2021 **Baxter Summer Scholars Astro. Day**, Northwestern University, Evanston, IL.

2019 **CU Boulder MASP PEAC Science Day**, University of Colorado, Boulder, CO.

Sommers-Bausch Observatory Astro. Day, University of Colorado, Boulder, CO.

2018 **Sommers-Bausch Observatory Astro. Day**, University of Colorado, Boulder, CO.

2017 **CU Boulder MASP PEAC Science Day**, University of Colorado, Boulder, CO.

Sommers-Bausch Observatory Astro. Day, University of Colorado, Boulder, CO.

References

Prof. Benjamin P. Brown
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Prof. Jeffrey S. Oishi
Dept. Physics and Astronomy
Bates College
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