Ekta Patel, PhD

University of Utah, Department of Physics and Astronomy, Salt Lake City, UT 84112

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Research Interests: Near-field cosmology, galactic dynamics, low mass galaxies, computational astrophysics

Appointments

Hubble Fellow | *August 2023–Present*
Department of Physics & Astronomy, University of Utah

Postdoctoral Fellow | *August 2022–2023*
Department of Astronomy, University of California, Berkeley

Miller Research Fellow | *August 2019–2022*
Miller Institute for Basic Research in Science, University of California, Berkeley

Education

University of Arizona **Tucson, AZ**
M.S., Ph.D. in Astronomy & Astrophysics *2017, 2019*

Thesis: "Dynamics of Local Group Satellite Galaxies in the Era of Precision Astrometry"
Advisor: Dr. Gurtina Besla

New York University **New York, NY**
B.A. in Physics with Honors *2014*

Senior Honors Thesis: "The Sloan Digital Sky Survey Large Galaxy Atlas"
Advisor: Dr. David Hogg

Honors and Awards

Raynor L. Duncombe Student Research Prize, Division of Dynamical Astronomy, 2019
National Science Foundation Astronomy & Astrophysics Postdoctoral Fellowship, 2019 (Declined)
National Science Foundation Graduate Research Fellowship, 2016-2019
College of Science Service Award, University of Arizona, 2016
Ford Foundation Pre-Doctoral Fellowship, 2015, Honorable Mention and Alternate Candidate

Publications

I have authored **32 refereed journal publications**, including 7 first author publications and 11 publications where I made significant contributions. See my full list of publications on Page 7.

Grants

As Principal Investigator: 3, As Co-Investigator: 13

NASA Hubble Fellowship (**PI: E. Patel**), 2023-2026, ∼$440,000 to Patel
HST Cycle 31 GO 17484 (**PI: E. Patel**) – $57,178; $3,912 to Patel
HST Cycle 31 GO 17434 (PI: E. Vitral)
HST Cycle 31 GO 17501 (PI: P. Bennet)
HST Cycle 31 GO 17513 (PI: P. Bennet)

HST Cycle 29 AR 16628 (**PI: E. Patel**) – $205,049 to Patel
Gemini S22B GN-2022B-Q-231 (PI: Q. Liu)
HST Cycle 30 GO 17174 (PI: P. Bennet)
HST Cycle 29 GO 16737 (PI: S.T. Sohn)
HST Cycle 29 GO 16778 – Treasury (PI: B. Williams)
HST Cycle 28 GO 16293 (PI: Y. Choi)
HST Cycle 28 GO 16274 (PI: ST. Sohn & M. Fardal)
HST Cycle 28 GO 16273 (PI: S.T. Sohn)
HST Cycle 27 GO 15902 – Treasury (PI: D. Weisz)
HST Cycle 27 GO 15911 (PI: A. del Pino)
HST Cycle 26 GO 15658 (PI: S.T. Sohn)

Advisees

As Postdoctoral Researcher

Tadg Noland	Undergrad. Student, U of Utah (B.S. 2026)	Project Advisor	2024
Lipika Chatur	Undergrad. Student, UT Austin (B.S. 2025)	Project Advisor	2023-2024
Katie Chamberlain	Grad. Student, U of Arizona (Ph.D. 2024)	Project Co-advisor (w/ G. Besla)	2022-2024
Elaheh Hayati	Grad. Student, U of Arizona (Ph.D. 2025)	Project Co-advisor (w/ P. Behroozi)	2021-present
Hannah Richstein	Grad. Student, U of Virgina (Ph.D. 2024)	Collaborator/Mentor	2021-2023
David Setton	Grad. Student, U of Pittsburgh (Ph.D. 2023)	Collaborator/Mentor	2021-2023
Sal Wanying Fu	Grad. Student, UC Berkeley (Ph.D. 2025)	Collaborator/Mentor	2021-2022

As Graduate Student

Amanda Quirk	Grad. Student, UC Santa Cruz (Ph.D. 2022)	Project Advisor	2018-2020

Selected Talks & Presentations

Invited: 26

Apr 2024	Galaxies/AGN Journal Club	Space Telescope Science Institute
Feb 2024	Keynote Talk	XMC Milky Clouds Over Manhattan Workshop
Jan 2024	Astronomy Colloquium	University of California, San Diego
Oct 2023	HEAP/PER Seminar	University of Utah
Nov 2022	Astronomy Colloquium	University of Virginia/NRAO
Feb 2022	Lunch Talk	Carnegie Observatories
Feb 2022	Astronomy Colloquium	University of Florida
Feb 2022	Astronomy Colloquium	University of Maryland
Nov 2021	Lunch Seminar	Miller Institute for Basic Research in Science
Jun 2021	ISM* Seminar	Space Telescope Science Institute
Apr 2021	Astronomy Seminar	New York University Center for Cosmology and Particle Physics
Apr 2021	Astronomy Colloquium	University of Michigan
Feb 2021	Astronomy Colloquium	University of California, Santa Cruz
Feb 2021	Astronomy Colloquium	University of Oklahoma
Nov 2020	Astrophysics Roundtable	University of California, Berkeley
Nov 2020	Astronomy Colloquium	Yale University
Oct 2020	Seminar	Princeton University Institute for Advanced Study

Sep 2020	Astrophysics Seminar	Rutgers University
Sep 2020	Astronomy Colloquium	University of California, Berkeley
Mar 2020	Seminar	Las Cumbres Observatory
Jun 2019	Student Prize Talk	50th Division of Dynamical Astronomy Meeting
Nov 2018	Seminar	Ohio State University Center for Cosmology and Astroparticle Physics
Oct 2018	Astronomy Lunch Talk	University of California, Berkeley
Oct 2018	Astrophysics Seminar	American Museum of Natural History ,
Jul 2018	Overview Talk	PHAT Collaboration Team Meeting
Jun 2018	Press Conference	232nd American Astronomical Society Meeting

Contributed Conference Presentations: 15

Sept 2023	Pasadena, CA	NASA Hubble Fellowship Program Symposium
Jan 2024	New Orleans, LA	243rd American Astronomical Society Meeting
Jan 2024	Sexten, Italy	The Milky Way is Not an Island: The Halo of the Galaxy and its Satellites
Sept 2023	Cambridge, MA	NASA Hubble Fellowship Program Symposium
Mar 2023	Germany	IAUS379: Dynamical Masses of Local Group Galaxies
Nov 2022	Australia	Linking the Galactic and Extragalactic
Aug 2022	South Korea	IAU General Assembly Division H Meeting
Dec 2020	virtual	Linking the Galactic and Extragalactic (*runner-up for best contributed talk*)
Sep 2020	virtual	The Local Group: Assembly and Evolution
Nov 2019	Palo Alto, CA	Bay Area Local Group Meeting
Jul 2019	United Kingdom	Small Galaxies, Cosmic Questions
Jun 2018	Denver, CO	232nd American Astronomical Society Meeting
Jul 2017	Netherlands	Large Surveys of the Great Andromeda Galaxy
Apr 2017	Tucson, AZ	Marc Aaronson Symposium (poster)
Jun 2015	Ann Arbor, MI	Local Group Astrostatistics Conference (poster)

Teaching Experience

- 2017-2018 | University of Arizona
  - ASTR400B: Galactic & Extragalactic Astronomy and Cosmology (Teaching Assistant)
  - Astronomy Tutoring for Majors & Minors Program (Tutor)
- 2015-2017 | Ph.G. Tutoring, Tucson, AZ
  - Tutor for elementary through high school students in mathematics
- 2013-2014 | New York University
  - Einstein's Universe (Laboratory Teaching Assistant)
  - Physics II: Intro to Electromagnetism (Teaching Assistant)
  - General Physics I (Adjunct)

Leadership & Service Experience

Leadership Experience

- **UC Berkeley Astronomy Department**
  Cal-URSA (Undergraduate Research Scholarships in Astronomy)
  Lead Developer & Coordinator | 2021
  - Develop a paid, semester-long undergraduate research opportunity for Bay Area students majoring in physics and astronomy, especially those individuals who identify with groups that have been historically excluded from STEM, to work on scientific research at UC Berkeley Astronomy
  - Request and secure funds from UC Berkeley Department of Astronomy

- Solicit project submissions from UC Berkeley postdocs and research staff
- Advertise and evaluate candidate applications using an equitable and inclusive process
- Coordinate hiring logistics and organize professional development events for inaugural cohort of students

Postdoc Representative | *2020–2021*

- Serve as a liaison between postdoctoral scholars and department leadership
- Attend bi-weekly meetings to communicate requests from the postdoc community and receive department updates
- Organize once per semester town halls to collect feedback from the postdoc community

Diversity, Equity, Inclusion, & Climate Committee
Postdoc Representative | *2020–2021*

- Work with faculty, students, postdocs, and staff to outline recommendations addressing representation and support networks for individuals belonging to marginalized groups in astronomy
- Contribute to the development of a climate advisors program to promote positive department culture

- **Miller Institute for Basic Research in Science**
  Diversity, Equity, and Inclusion Working Group Member | *2020–2022*
  - Work with Miller Research Fellows and faculty to provide recommendations for improving the overall climate and hiring practices at the Miller Institute
  - Contribute to the development of the Meet a Miller Fellow × El Cerrito High School community outreach program

- **University of Arizona Department of Astronomy and Steward Observatory**
  Graduate Council Member | *2015–2017*
  - Acted as a liaison between astronomy graduate students and faculty, including department leadership
  - Launched a seminar series highlighting non-academic career trajectories

Professional Service

NHFP Fellowship Feedback Program 2024	Co-organizer
Yellowstone XMC Workshop 2025	Scientific Organizing Committee
Poverty in Astronomy Working Group	Data Analysis Team Member
The Astrophysical Journal	Referee
Monthly Notices of the Royal Astronomical Society	Referee
Astronomy & Astrophysics	Referee
Black in Physics Week 2022	Volunteer
Roman-Rubin Synergy Working Group	Member
Roman Research and Support Participation Opportunities	Reviewer
APS Conference for Undergraduate Women in Physics 2023 (Texas Christian University)	Panelist
Hubble Space Telescope Time Allocation Committee	Reviewer
NASA Astrophysics Data Analysis Grants Program	Reviewer
Swiss National Science Foundation	Reviewer
NASA FINESST Graduate Fellowship Program	Reviewer
NASA Astrophysics Theory Grants Program	Executive Secretary

Community Mentoring Experience

"A Guide to Applying for Postdocs" Worskhop	Designer, Presenter	2022, 2023
Astronomy Mentorship Program for Upcoming Postdocs (AMP-UP)	Mentor	2023-2024
Physical science Opportunities for Womxn in Education and Research (POWER) Bay Area	Mentor	2020-2021
University of Arizona Graduate College Application Support Program	Editor	2017
Tucson Initiative for Minority Engagement in Science and TEchnology Program (TIMESTEP)	Mentor	2015-2019
U. of Arizona Astronomy Graduate Student-Postdoc Mentoring Program	Mentor	2017
Tucson Women in Astronomy Mentoring Program	Mentor	2014-2016

Science Communication

Invited Public Presentations: 10

2024	Rewinding the Orbits of Nearby Galaxies	Astronomy on Tap, Los Angeles
2024	Rewinding the Orbits of Nearby Galaxies	Astronomy on Tap, Salt Lake City
2021	Satellite Galaxies in the Local Group	Eastbay Astronomical Society
2020	Satellite Galaxies in the Local Group	UC Berkeley Astronomy Night
2020	Satellite Galaxies in the Local Group	Mount Diablo Astronomical Society
2020	Satellite Galaxies in the Local Group	San Francisco Amateur Astronomers
2020	Satellite Galaxies in the Local Group	San Mateo County Astronomical Society
2019	Satellite Galaxies in the Local Group	Huachuca Astronomical Society
2018	Satellite Galaxies and Dwarfs in the Local Group	Sonora Astronomical Society
2017	Satellite Galaxies and Dwarfs in the Local Group	Tucson Amateur Astronomy Association

Community Engagement

2024	Speaker	8th Grade Science Visit	Middle School Students (Salt Lake City, UT)
2020-2021	Speaker	Meet a Miller Fellow	High School Students (El Cerrito, CA)
2020	Speaker	Meeting of the Minds	College Students (Lamat Program), UC Santa Cruz
2018, 2019	Speaker, Instructor	Teen Astronomy Cafe	High School Students (Tucson, AZ)
2016-2017	Classroom Astronomer	Project ASTRO	High School Students (Tucson, AZ)
2015-2016	Classroom Astronomer	Project ASTRO	Elementary School Students (Tucson, AZ)
2018	Keynote Speaker	Commencement	Academy of Tucson High School (Tucson, AZ)
2018	Instructor	Colors of Nature	Middle School Students (Kitt Peak, AZ)
2017, 2018	Instructor	Colors of Nature	Middle School Students (Tucson, AZ)

Selected Press & Media Features

2024 Sky & Telescope, *Astronomers Find 100,000 Light-Year Bow Shock in the Milky Way's Outskirts*
2022 Discover Magazine, *Our Galaxy is on a Collision Course. And It's Not the First Time*
2022 Scientific American, *Women Are Creating a New Culture for Astronomy*
2021 Sky & Telescope, *How Our Largest Dwarf Galaxy Keeps the Others in Line*
2021 Miller Institute Newsletter, *Spring 2021 Miller Fellow Focus: Ekta Patel*
2020 STEAM Squad Curriculum Book - Blasts Off!, *Meet Ekta Patel, Ph.D.*
2019 European Space Agency, *Gaia clocks new speeds for Milky Way-Andromeda collision*
2019 The New York Times, *Andromeda Is Coming for Our Milky Way Galaxy, Eventually*
2019 Astronomy Magazine Ask Astro Column Response, *Will the Pinwheel Galaxy (M33) merge with the Andromeda Galaxy (M31) prior to Andromeda merging with the Milky Way?*
2019 National Geographic, *Our galaxy is due to crash into its neighbor—but when?*

2019 Space.com, *We Finally Know When Our Milky Way Will Crash Into the Andromeda Galaxy*
2019 Active Galactic Women of Discovery Series, *Galaxy Evolution with Ekta Patel*
2019 LiveScience.com, *How Massive is the Milky Way?*
2018 University of Arizona Press Release, *How do you Weigh a Galaxy? Especially the One You're In?*
2018 Air & Space Magazine, *How to Weigh a Galaxy*
2018 International Business Times, *Milky Way's Mass Estimated More Reliably Using Satellite Galaxies Angular Momentum*
2018 Nature Research Highlights, *Measuring the Milky Way's mind-boggling mass*
2018 American Astronomical Society Nova, *Using Satellite Galaxies to Weigh the Milky Way*
2018 Space.com, *Milky Weigh: New Method Pins Down Our Galaxy's Mass*
2018 Astronomy Magazine, *A whole new way to weigh the Milky Way*

Technical Skills

- Programming: Python (primary), C, C++, GitHub
- Software: Microsoft Office Suite, Google Suite, LaTeX, Zoom, Box, Dropbox, Slack
- Systems: Linux, Macintosh OS-X, Windows

Professional References

** indicates primary references*

Dr. Gurtina Besla*
Associate Professor, Department of Astronomy
Associate Astronomer, Steward Observatory
University of Arizona
gbesla@arizona.edu

Dr. Dan Weisz*
Associate Professor, Department of Astronomy
University of California, Berkeley
dan.weisz@berkeley.edu

Dr. Roeland van der Marel*
Astronomer, Space Telescope Science Institute
Adjunct Professor, Johns Hopkins University
marel@stsci.edu

Dr. Nitya Kallivayalil
Associate Professor
Department of Astronomy
University of Virginia
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Dr. Yao-Yuan Mao
Assistant Professor
Department of Physics and Astronomy University of Utah
yymao@astro.utah.edu

List of Publications

[see my full list of publications on ADS here]
** indicates publications where I served as the primary scientific advisor*

First Author Publications

37. ***Patel, E.**, Chatur, L., Mao, Y.-Y. (2024). *Temporal Evolution of the Radial Distribution of Milky Way Satellite Galaxies*, submitted to ApJ

36. **Patel, E.** & Mandel, K. (2023). *Evidence for a Massive Andromeda Galaxy Using HST and Gaia Satellite Galaxy Proper Motions*, ApJ, 948, 104

35. **Patel, E.**, Kallivyayalil, N., Garavito-Camargo, N., et al. (2020). *The Orbital Histories of Magellanic Satellites Using Gaia DR2 Proper Motions*, ApJ, 893, 121,

34. **Patel, E.**, Carlin, J., Tollerud, E., Collins, M., Dooley, G. (2018). *LCDM Predictions for the Satellite Population of M33*, MNRAS, 480, 1883-1897

33. **Patel, E.**, Besla, G., Mandel, K., Sohn, S.T. (2018). *Estimating the Mass of the Milky Way Using the Ensemble of Classical Satellite Galaxies*, ApJ, 857, 78-94

32. **Patel, E.**, Besla, G., Mandel, K. (2017). *The Orbits of Massive Satellite Galaxies - II. Bayesian Estimates of the Milky Way and Andromeda masses using high precision astrometry and cosmological simulations*, MNRAS, 468, 3428-3449

31. **Patel, E.**, Besla, G., Sohn, S.T. (2017). *The Orbits of Massive Satellite Galaxies - I. A Close Look at the Large Magellanic Cloud and a New Orbital History for M33*, MNRAS, 464, 3825-3849

Publications where I made substantial contributions:

30. Bennet, P., **Patel, E.**, Sohn, S. T., et al. (2024). *Proper Motions and Orbits of Distant Local Group Dwarf Galaxies*, ApJ, 2024, 971, 98

29. Richstein, H., **Patel, E.**, et al. (2022). *Structural parameters and possible association of the UFDs Pegasus III and Pisces II*, ApJ, 933, 217

28. Garavito-Camargo, N., **Patel, E.**, Besla, G., et al. (2021). *The Clustering of Orbital Poles Induced by the LMC: Hints for the Origin of Planes of Satellites*, ApJ, 923, 140

27. Sohn, S.T., **Patel, E.**, Fardal, M. A., et al. (2020). *HST Proper Motions of NGC 147 and NGC 185: Orbital Histories and Tests of a Dynamically Coherent Andromeda Satellite Plane*, ApJ, 901, 43

26. van der Marel, R. P., Fardal, M., Sohn, S.T., **Patel, E.**, et al. (2019). *First Gaia Dynamics of the Andromeda System: DR2 Proper Motions, Orbits, and Rotation of M31 and M33*, ApJ, 872, 24

25. Sohn, S.T., **Patel, E.**, et al. (2017). *Space Motions of the Dwarf Spheroidal Galaxies Draco and Sculptor Based on HST Proper Motions with $\sim$ 10 Year Base-Line*, ApJ, 849, 93

Publications led by students (including 6 where I made substantial contributions)

24. * Chamberlain, K., **Patel, E.**, Besla, G., et al. (2024). *A Physically Motivated Framework to Compare Merger Timescales of Isolated Low- and High-Mass Galaxy Pairs Across Cosmic Time*, accepted to ApJ

23. Foote, H.R., Besla, G., Garavito-Camargo, N., **Patel, E.**, et al. (2024). *Segue 2 Recently Collided with the Cetus-Palca Stream: New Opportunities to Constrain Dark Matter in an Ultra-Faint Dwarf*, submitted to ApJ

22. Liu, Q., Abraham, R., Martin, P. G., and 12 others including **Patel, E.** (2024). *Fuzzy Galaxies or Cirrus? Decomposition of Galactic Cirrus in Deep Wide-Field Images*, submitted to ApJ

21. Richstein, H., Kallivayalil, N. K., Simon, J. D. and 16 others including **Patel, E.** (2024). *Deep Hubble Space Telescope Photometry of LMC and Milky Way Ultra Faint Dwarfs: A careful look into the magnitude-size relation*, ApJ, 967, 72

20. Hayati, E., Behroozi, P., **Patel, E.** (2024). *Machine Learning the Dark Matter Halo Mass of Milky Way-Like Systems*, Open Journal of Astrophysics, 7, 26

19. Chamberlain, K., Besla, G., **Patel, E.**, et al. (2024). *A physically motivated framework for measuring the mass and redshift dependence of galaxy pair fractions across cosmic time*, ApJ, 962, 162

18. Santistevan, I., Wetzel, A., Tollerud, E. and 3 others including **Patel, E.** (2024). *Modeling the orbital histories of satellites of Milky Way-mass galaxies: testing static host potentials against cosmological simulations*, MNRAS, 527, 8841

17. Setton, D., Besla, G., **Patel, E.**, et al. (2023). *The Large Magellanic Cloud's* ~ 30 *Kiloparsec Bow Shock and its Impact on the Circumgalactic Medium*, ApJ, 959, L11

16. Fu, S.W., Weisz, D.R., Starkenburg, E. and 10 others including **Patel, E.** (2023). *Metallicity Distribution Functions of 13 Ultra-Faint Dwarf Galaxy Candidates from Hubble Space Telescope Narrowband Imaging*, ApJ, 958, 167

15. Quirk, A., Guhathakurta, P., Gilbert, K., Chemin, L., Dalcanton, J. and 8 others including **Patel, E.** (2022). *The Triangulum Extended (TREX) Survey: The Stellar Disk Dynamics of M33 as a Function of Stellar Age*, AJ, 163, 166

14. Fu, S.W., Weisz, D.R., Starkenburg, E. and 9 others including **Patel, E.** (2022). *Metallicity Distribution Function of the Eridanus II Ultra-Faint Dwarf Galaxy from Hubble Space Telescope Narrow-band Imaging*, ApJ, 925, 6

13. * Quirk, A. & **Patel, E.** (2020). *Asymmetric Drift of Andromeda Analogs in the Illustris Simulations*, MNRAS, 497, 2870-2882

Publications where I contributed data and/or substantial comments

12. Chen, Z., Williams, B., Lang, D. and 25 others including **Patel. E.** (2024). *The Panchromatic Hubble Andromeda Southern Treasury (PHAST). I. Ultraviolet and Optical Photometry of 96 Million stars in M31*, accepted to ApJ

11. Garavito-Camargo, N., Price-Whelan, A., Samuel, J., and 8 others including **Patel, E.** (2023). *On the co-rotation of Milky Way satellites: LMC-mass satellites induce apparent motions in outer halo tracers*, accepted to ApJ

10. Savino, A., Weisz, D. R., Skillman, E. and 34 others including **Patel, E.** (2023). *The Hubble Space Telescope Survey of M31 Satellite Galaxies II. The Star Formation Histories of Ultra-Faint Dwarf Galaxies*, ApJ 956, 86

9. Dey, A., Najita, J. R., Koposov, S. E. and 45 others including **Patel, E.** (2023). *DESI Observations of the Andromeda Galaxy: Revealing the Immigration History of our Nearest Neighbor*, ApJ, 944, 1

8. Savino, A., Weisz, D. R., Skillman, E. and 33 others including **Patel, E.** (2022). *The Hubble Space Telescope Survey of M31 Satellite Galaxies I. RR Lyrae-based Distances and Refined 3D Geometric Structure*, ApJ, 938, 101

7. Sacchi, E., Richstein, H., Kallivayalil, N. and 18 others including **Patel, E.** (2021). *Star Formation Histories of Ultra-faint Dwarf Galaxies: Environmental Differences between Magellanic and Non-Magellanic Satellites?*, ApJL, 920, L19

6. Besla, G., Patton, D., Stierwalt, S., Rodriguez-Gomez, V. and 7 others including **Patel, E.** (2018). *The Frequency of Dwarf Galaxy Multiples at Low Redshift in SDSS vs. Cosmological Expectations*, MNRAS, 480, 3376-3396

White Papers and Proceedings

5. Sohn, S. T., Fardal, M., **Patel, E.**, et al. (2023) *Proper Motions of M31 Satellite Galaxies*, Dynamical Masses of Local Group Galaxies: IAU Symposium 379

4. Dey, A., Najita, J., Filion, C. and 50 others including **Patel, E.** (2023). *RomAndromeda: The Roman Survey of the Andromeda Halo*, arXiv:2306.12302

3. Valluri, M., Chabanier, S., Iršič, V. and 29 others including **Patel, E.** (2022). *Snowmass2021 Cosmic Frontier White Paper: Prospects for obtaining Dark Matter Constraints with DESI*, arXiv:2203.07491

2. Roman Rubin Synergy Working Group including **Patel, E.** (2022). *R2–D2: Roman and Rubin – from Data to Discovery*, arXiv:2202.12311

1. Gilbert, K., Tollerud, E. J., Anderson, J. and 34 others including **Patel, E.** (2019). *Construction of an L_*—Galaxy: the Transformative Power of Wide Fields for Revealing the Past, Present and Future of the Great Andromeda System*, Astro2020: Decadal Survey on Astronomy and Astrophysics, Bulletin of the American Astronomical Society, Vol. 51, Issue 3, id. 540

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