

# NICHOLAS Z. RUI

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## EDUCATION

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- B.A. Physics, Astrophysics** (in progress) 2016 — (2020)  
University of California, Berkeley — College of Letters and Science  
Berkeley, CA
- High School Diploma** 2012 – 2016  
Rancho Bernardo High School  
San Diego, CA

## RESEARCH

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- Dynamical simulations of globular clusters** ([site](#)) 2019 —  
Advisor: *Frederic A. Rasio* ◊ Mentor: *Kyle Kremer*  
*NU Department of Physics and Astronomy (CIERA)*
- Interests: *star cluster dynamics; globular clusters; Cluster Monte Carlo (CMC); black holes; compact binaries*
  - Funding: *NASA Illinois Space Grant (ISG)*
- Nanoscale sensing using solid-state defects** ([site](#)) 2018 —  
Advisor: *Norman Y. Yao* ◊ Mentor: *Satcher Hsieh*  
*UCB Department of Physics*
- Interests: *nitrogen-vacancy centers; silicon-vacancy centers; nanoscale sensing; high pressure; diamond anvil cells*
  - Funding: *Berkeley Physics Undergraduate Research Scholars Program (BPURS)*
- Young massive clusters in the Galactic Center** ([site](#)) 2016 – 2019  
Advisor: *Jessica R. Lu* ◊ Mentor: *Matthew W. Hosek Jr.*  
*UCB Department of Astronomy*
- Interests: *star cluster formation, evolution, and dynamical structure; Arches and Quintuplet clusters; Galactic Center; young massive clusters; astrometry*

## REFEREED PUBLICATIONS

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[Google Scholar](#) ◊ [Astrophysics Data System](#) ◊ [arXiv](#) ◊  0000-0002-1884-3992

- [4] Kremer, K.; Ye, C. S.; **Rui, N. Z.**; Weatherford N.; Chatterjee, S.; Fragione, G.; Rodriguez, C. L.; Spera, M.; Rasio, F. A.; *Modeling Dense Star Clusters in the Milky Way and Beyond with the CMC Cluster Catalog*. *Astrophys. J., Suppl. Ser.* **274**, 2 (2020). [arXiv:1911.00018](#)
- [3] Hsieh, S.; Bhattacharyya, P.; Zu, C.; Mittiga, T.; Smart, T. J.; Machado, F.; Kobrin, B.; Höhn, T. O.; **Rui, N. Z.**; Kamrani, M.; Chatterjee, S.; Choi, S.; Zaletel, M.; Struzhkin, V. V.; Moore, J. E.; Levitas, V. I.; Jeanloz, R.; Yao, N. Y.; *Imaging stress and magnetism at high pressures using a nanoscale quantum sensor*. *Science* **366**, 1349-1354 (2019). [arXiv:1812.08796](#)
- [2] **Rui, N. Z.**; Hosek Jr., M. W.; Lu, J. R.; Clarkson, W. I.; Anderson, J.; Morris, M. R.; Ghez, A. M.; *The Quintuplet Cluster: Extended Structure and Tidal Radius*. *Astrophys. J.* **877**, 1 (2019). [arXiv:1904.02395](#)
- [1] Mittiga, T.; Hsieh, S.; Zu, C.; Kobrin, B.; Machado, F.; Bhattacharyya, P.; **Rui, N. Z.**; Jarmola, A.; Choi, S.; Budker, D.; Yao, N. Y.; *Imaging the local charge environment of nitrogen-vacancy centers in diamond*. *Phys. Rev. Lett.* **121**, 246402 (2018). [arXiv:1809.01668](#)

## OTHER PUBLICATIONS

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[2] **Rui, N.**; Kim, Y.; *Prioritizing Well-Being: Berkeley Chapter Focuses on Health, Inclusion, and Community*. The SPS Observer (2020).

[1] Hosek Jr., M. W.; Lu, J. R.; Andersen, M.; Do, T.; Kim, D.; **Rui, N. Z.**; Boyle, P.; Williams, B. F.; Chakrabarti, S.; Beaton, R. L.; *The Stellar Initial Mass Function Across Different Environments*. Astro2020 White Paper (2019). arXiv:1903.05107

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## RELEVANT COURSEWORK

UCB transcript available upon request.

**Physics:** classical mechanics, classical electromagnetism, optics, quantum mechanics, quantum information and computing, particle physics, statistical mechanics, special and general relativity, atomic physics

**Astrophysics:** cosmology, planetary astrophysics, astrophysical fluid dynamics, astronomical data

**Mathematics:** multivariable calculus, linear algebra, differential equations

**Other:** electronics, selected experiments

Graduate coursework in *planetary astrophysics, astrophysical fluid dynamics, electromagnetism, and quantum mechanics*.

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## TEACHING

### Democratic Education at Cal ([site](#))

- Spring 2020 – Astronomy 98: *Beginner's Guide to the Universe* (faculty sponsor: *Jessica Lu*) ([site](#))
- Fall 2019 – Astronomy 98: *Beginner's Guide to the Universe* (faculty sponsor: *Jessica Lu*) ([site](#))
- Spring 2019 – Astronomy 98, 198: *Python for Astronomers* (faculty sponsor: *Daniel Weisz*) ([site](#))
- Spring 2018 – Astronomy 98, 198: *Python for Astronomers* (faculty sponsor: *Mariska Kriek*)

### Splash at Berkeley ([site](#))

- Spring 2019 – M507: *Mostly Complex*
- Fall 2018 – S391: *Why Quantum?*
- Fall 2018 – S392: *Spacetime*

### Course Reader

- Spring 2020 – Physics/Astronomy C202: *Astrophysical Fluid Dynamics* (instructor: *Eugene Chiang*)
- Fall 2018 – Physics 110A: *Electromagnetism and Optics* (instructor: *Kam-Biu Luk*)

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## AWARDS

National Science Foundation Graduate Research Fellowship (2020-2023)

Bernard Fries Memorial Award (2019-2020)

Illinois Space Grant (2019)

Dean's List (2016-2019)

Honors to Date (2016-2019)

Isidore Pomerantz Endowment Award (2018-2019)

Berkeley Physics Undergraduate Research Scholar (2018)

National Merit Scholarship Finalist (2016)

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## SERVICE AND OUTREACH

### Society of Physics Students at Berkeley ([site](#))

- 2019-2020: President
- 2018-2019: Co-vice president *alongside R. Pan* ([chapter report](#))
- 2017-2018: Outreach coordinator ([chapter report](#))

### Committee Appointments

- Undergraduate Student Services Committee, *UCB Department of Astronomy* (2019)

- Major Curriculum Committee, *UCB Department of Physics* (2018 – 2020)

### **Public Outreach Talks**

- *Star Clusters: Many-Body Laboratories*. Marin Science Seminar (Terra Linda High School), Berkeley, CA, November 2019.
- *Globular Clusters: Many-Body Laboratories*. What's Up! Astronomy Talks @Claremont (Claremont Branch Library), Berkeley, CA, November 2019.
- *50th Anniversary of the Apollo 11 Moon Landing*. CIERA Astronomer Evenings (Dearborn Observatory, Northwestern University), Evanston, IL, July 2019.