

# John J. Ruby IV

Lead Innovator  
Houston Astros

501 Crawford St,  
Houston, TX 77002

Citizenship: US  
Email: [jruby@astros.com](mailto:jruby@astros.com)

## Education

---

<b>University of Rochester</b>	Rochester, NY
<i>PhD, Physics</i>	2021
— Horton Fellow at Laboratory for Laser Energetics Advisors: Profs. Gilbert Collins and J. Ryan Rygg	
<b>University of Rochester</b>	Rochester, NY
<i>MA, Physics</i>	2017
<b>Villanova University</b>	Villanova, PA
<i>BS, Astrophysics and Planetary Science, cum laude</i>	2016

## Honors and Awards

---

Lawrence Postdoctoral Research Fellowship, 2021-2022  
Frank J. Horton Graduate Research Fellowship, 2017-2021  
Gordon Research Conference on High Pressure Poster Award, 2018  
Villanova University Medallion (Graduated top of Class), 2016  
Jason Cardelli Memorial Award (Villanova; Undergraduate research award), 2016  
Lawrence Livermore National Laboratory Student Poster Award, 2015  
Edwin Bailey Memorial Award (Villanova), 2014

## Service

---

Member: American Physical Society  
Referee for Physics of Plasmas  
Session Drafting Chair: *Extreme Physics Extreme Data*, 2020  
Early Career Scientist Panel: *Omega Laser Users Group*, 2019  
Upward Bound Physics Course Instructor, 2017  
Presidential Volunteer Service Award (Silver), 2012

## Mentorship

---

Spencer Ressel (undergraduate) – PhD student at UW Atmospheric Sciences  
Ethan Smith (graduate) – PhD student at University of Rochester Physics  
Adam Bedel (undergraduate) – PhD Student in UMICH Applied Physics

## Leadership

---

Started Experimental High Energy Density Physics (HEDP) graduate student group  
Started Bayesian Inference working group in experimental HEDP division at LLE  
Started Software Development working group in experimental HEDP division at LLE  
Founder and manager of official LLE Coed softball team (Diamond Ablators)

## Research Experience

---

### **Houston Astros LLC.**

Houston, TX

Lead Innovator

Fall 2022 – Present

Decision Sciences

- Apply Bayesian-physical models to various baseball systems.
- Conduct original research in areas of biomechanics, rigid body mechanics, and aerodynamics.
- Solicit new ideas and promote idea generation across organization.
- Develop and budget for an implementation plan to carry out research projects across departments.

### **Lawrence Livermore National Laboratory**

Livermore, CA

Lawrence Postdoctoral Fellow

Fall 2021 – Fall 2022

Physical and Life Sciences Directorate

- Manage self-directed research project funded for ~1.2m over 3 years.
- Develop novel thermal physics models to interpret experimental and observational data.
- Apply Bayesian modelling to stellar models and observations.

### **Center for Matter at Atomic Pressures**

Rochester, NY

Postdoctoral Research Fellow

Spring 2021 – Fall 2021

Advisors: Profs. Gilbert Collins & J. Ryan Rygg

- Develop Bayesian inference techniques to combine astronomical and HED data.
- Advise students on experimental design and research directions.

### **Laboratory for Laser Energetics**

Rochester, NY

Graduate Research Fellow

Summer 2017 – Spring 2021

Advisors: Profs. Gilbert Collins & J. Ryan Rygg

- Propose, design, simulate, and conduct experiments on the Omega60 Laser system.
- Develop novel ways of analyzing high energy density physics (HEDP) experiments.
- Lead the development of advanced statistical tools for the HEDP group.
- Advised undergraduate student in building ray-trace code for streaked radiography.

### **Lawrence Livermore National Laboratory**

Livermore, CA

Student Research Intern

Summer 2014 – Summer 2016

Advisor: Dr. Arthur Pak

- Built analysis tools for x-ray imaging on the National Ignition Facility (NIF)
- Participated in a Laser Wakefield experiment on the Titan Laser.
- Participated in a proton acceleration experiment on the Titan Laser.

## Villanova University

Undergraduate Researcher

Advisors: Profs. Edward Guinan & Edward Sion

- Investigated shock heating in the atmospheres of Cepheid variable stars.
- Modelled the spectral output of accretion discs in Cataclysmic Variables.

Villanova, PA

Fall 2014 – Spring 2016

## Teaching Experience

---

### University of Rochester

- PHY 255: Intro to Fluid Dynamics
- PHY 182: E&M Lab

Rochester, NY

Summer 2018  
Fall 2016 – Spring 2017

### Villanova University

- PHY 2400: Physics II E&M, Teaching fellow.
- PHY 1101: General Physics I Lab, Teaching fellow.

Villanova, PA

Spring 2015 – Spring 2016  
Fall 2014

## Publications

---

### Peer-Reviewed Articles

12. D.A. Chin, P.M. Nilson, D. Mastro Simone, D. Guy, **J.J. Ruby**, D.T. Bishel, J.F. Seely, F. Coppari, Y. Ping, J.R. Rygg, G.W. Collins. High-resolution x-ray Spectrometer for x-ray Absorption Fine Structure Spectroscopy, *Reviews of Scientific Instruments* 94 (1), 013101 (2023).
11. S. Ressel, **J.J. Ruby**, G.W. Collins, J.R. Rygg. Density Reconstruction in Convergent High-Energy-Density Systems Using X-Ray Radiography and Bayesian Inference, *Physics of Plasma* 29 (7), 072713 (2022).
10. D.A. Chin, **J.J. Ruby**, P.M. Nilson, D.T. Bishel, F. Coppari, Y. Ping, A.L. Coleman, S. Craxton, J.R. Rygg, G.W. Collins. Emission Phases of Implosion Sources for X-ray Absorption Fine Structure Spectroscopy, *Physics of Plasma* 29 (5), 052702 (2022).
9. **J.J. Ruby**, J.R. Rygg, J.A. Gaffney, Y. Ping, G.W. Collins. High-Energy-Density-Physics Measurements in Implosions Using Bayesian Inference, *Physics of Plasma* 28 (3), 032703 (2021).
8. B. Henderson, M.C. Marshall, T.R. Boehly, R. Paul, C. McCoy, S.X. Hu, D.N. Polsin, L. Crandall, M. Huff, D. Chin, **J.J. Ruby**, X. Gong, D.E. Fratanduono, J.H. Eggert, J.R. Rygg, G.W. Collins. Shock-Compressed Silicon: Hugoniot and Sound Speed to 2100 GPa, *Physical Review B* 103 (9), 094115 (2021).
7. F.J. Marshall, S.T. Ivancic, C. Mileham, P.M. Nilson, **J.J. Ruby**, C. Stoeckl, B.S. Scheiner, M.J. Schmitt. High-resolution x-ray radiography with Fresnel zone plates on the University of Rochester's OMEGA Laser Systems, *Reviews of Scientific Instruments* 92 (3), 033701 (2021).
6. P. Hatfield, J.A. Gaffney, G.J. Anderson, S. Ali, L. Antonelli, S. Başığmez-du Pree, J. Cintrin, M. Fajardo, P. Knapp, B. Kettle, B. Kostowski, M. Macdonald, D. Mariscal, M. Martin, T. Nagayama, C. Palmer, J.L. Peterson, S. Rose, **J.J. Ruby**, C. Schneider, M. Streeter, W. Trickey, B. Williams. Extreme Physics, Extreme Data: The data-driven future of high energy density science, *Nature* (2021).
5. **J.J. Ruby**, J.R. Rygg, D.A. Chin, J.A. Gaffney, P. Adrian, C.J. Forrest, V.Yu. Glebov, N.V. Kabadi, P.M. Nilson, Y. Ping, C. Stoeckl, G.W. Collins. Energy Flow in Thin Shell Implosion and Explosion, *Physical Review Letters* 125 (21), 215001 (2020).
4. **J.J. Ruby**, J.R. Rygg, D.A. Chin, J.A. Gaffney, P. Adrian, D. Bishel, C.J. Forrest, V.Yu. Glebov,

- N.V. Kabadi, P.M. Nilson, Y. Ping, C. Stoeckl, G.W. Collins. Constraining Physical Models at Gigabar Pressures, *Physical Review E* 102 (5), 053210 (2020).
3. **J.J. Ruby**, J.R. Rygg, J.A. Gaffney, B. Bachmann, G.W. Collins, 2019. A boundary condition for Guderley's converging shock problem, *Physics of Fluids* 31 (12), 126104 (2019).
  2. M. Gauthier, J.B. Kim, C.B. Curry, B. Aurand, E.J. Gamboa, S. Göde, C. Goyon, A. Hazi, S. Kerr, A. Pak, A. Propp, B. Ramakrishna, **J.J. Ruby**, O. Willi, G.J. Williams, C. Rödel, S.H. Glenzer. High-intensity laser-accelerated ion beam produced from cryogenic micro-jet target, *Review of Scientific Instruments* 87 (11), 11D827 (2016).
  1. **J.J. Ruby**, A.E. Pak, J.E. Field, T. Ma, B.K. Spears, L.R. Benedetti, D.K. Bradley, L.F. Berzak Hopkins, D.T. Casey, T. Döppner, D. Eder, D. Fittinghoff, G. Grim, R. Hatarik, D.E. Hinkel, N. Izumi, J.D. Kilkenny, S.F. Khan, J.P. Knauer, A.L. Kritcher, F.E. Merrill, J.D. Moody, S.R. Nagel, H-S Park, J.D. Salmonson, D.B. Sayre, D.A. Callahan, W.W. Hsing, O.A. Hurricane, P.K. Patel, M.J. Edwards. Spatially resolved X-ray emission measurements of the residual velocity during the stagnation phase of inertial confinement fusion implosion experiments, *Physics of Plasmas* 23 (7), 072701 (2016).

#### *Invited Presentations*

4. American Physical Society, Division of Plasma Physics (2020)
3. International Conference on High Energy Density Sciences (2020)
2. Extreme Physics Extreme Data (2020)
1. Villanova University, Dept of Physics (2016)

#### *Select Oral Presentations*

3. J.J. Ruby, J.R. Rygg, D.A. Chin, C.J. Forrest, V.Yu. Glebov, C. Stoeckl, G. Collins, B. Bachmann, Y. Ping, J.A. Gaffney, N. Kabadi, P. Adrian, 2019. Analysis for Self-Emission from Spherical Shock Experiments, 61<sup>st</sup> Annual Meeting, APS DPP, Ft. Lauderdale, FL
2. J.J. Ruby, J.R. Rygg, G. Collins, C.J. Forrest, V.Yu. Glebov, B. Bachmann, Y. Ping, H. Sio, N. Kabadi, 2019. Measurement of Spherically Converging Shock Waves on OMEGA, 21<sup>st</sup> Biennial Meeting, APS SCCM, Portland, OR.
1. J.J. Ruby, J.R. Rygg, G. Collins, C.J. Forrest, B. Bachmann, Y. Ping, H. Sio, N. Kabadi, 2018. Measurement of Plasma Conditions at Shock Collapse on OMEGA, 60<sup>th</sup> Annual Meeting, APS DPP, Portland, OR.

#### *Poster Presentations*

3. J.J. Ruby, J.R. Rygg, C.J. Forrest, G.W. Collins, B. Bachmann, Y. Ping, A.E. Jenei, J.A. Gaffney, H. Sio, N.V. Kabadi, 2018. Equation-of-State Measurements at High Pressure in Spherical Geometry, *Gordon Research Conference on Research at High Pressure*, Holderness, NH.
2. J.J. Ruby, J.R. Rygg, G.W. Collins, B. Bachmann, T. Doepfner, Y. Ping, J.A. Gaffney, A.E. Jenei, A. Kritcher, D.C. Swift, J. Nilsen, O.L. Landen, R. Hatarik, N. Masters, S.R. Nagel, P.A. Sterne, T. Pardini, S. Khan, P.M. Celliers, P.K. Patel, D.O. Gericke, R.W. Falcone, 2017. Analytic Analysis of Convergent Shocks to Multi-Gigabar Conditions, 59<sup>th</sup> Annual Meeting, APS DPP, Milwaukee, WI.
1. J.J. Ruby, S.G. Engle, E.F. Guinan, 2016. The Shocking Truth about Cepheids: The Secret X-ray Lives of Classical Cepheids: Origin of Pulsed FUV and X-Ray Emissions of delta Cep and beta Dor, 227<sup>th</sup> Semiannual Meeting, AAS, Kissimmee, FL.