

RONALD BALLOUZ

Postdoctoral Researcher ◊ JAXA

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EXPERIENCE

Japanese Aerospace Exploration Agency

Aerospace Project Research Associate

Sept 2017 - Present

Sagamihara, Japan

I am a postdoc at JAXA's Institute for Space and Astronautical Studies. As a member of the solid planetary bodies group, my research focuses on using computer simulations to study the interaction of spacecraft with the surface of small bodies. This has the dual benefit of aiding engineering design decisions by providing rapid and cheap testing of prototypes in a microgravity environment, and enhancing the scientific return of missions.

- Science team member on the Martian Moons eXploration (MMX) sample return mission to Phobos.
- Studied granular flows on the surface of Phobos.
- Studied landing and sampling spacecraft interactions with the surface of Phobos.
- Helped initiate a CubeSat concept to characterize volatiles on the Lunar Poles with nano-impactors.
- Authored (2) and Co-authored (4) papers in astrophysics and planetary science journals.

University of Maryland, Astronomy Department

PhD Student

Jan 2012 - May 2017

College Park, MD

- Studied catastrophic disruption of rubble-pile asteroids in the early solar system. Revised the catastrophic disruption criterion for objects with pre-impact rotation.
- Studied the interaction of spacecraft landers with the regolith surface of an asteroid for the OSIRIS-REx and Hayabusa-2 missions.
- Studied the formation of large scale structure in Saturn's B ring. Showed that the viscous overstability can develop in the rings for highly frictional ring particles.
- Collaborated with a group of four developers on `pkdgrav`, a highly optimized parallel code that solves multi-body collisional and gravitational physics.
- Authored (3) and Co-authored (7) papers in major astrophysics and planetary science journals.

University of Nice, Lagrange Laboratory

Chateaubriand Fellow

Oct 2015 - Feb 2016

Nice, France

- Awarded a Chateaubriand Fellowship from the French Embassy in the United States to further the scientific collaboration between the University of Maryland and the University of Nice.
- Used a parallel hydrodynamics code to study hyper-velocity impacts on asteroids.
- Modified code to study the physics and chemistry of impact cratering on asteroids.

Villanova University, Astronomy & Astrophysics Department

Undergraduate Research Assistant

May 2008 - May 2011

Villanova, PA

- Data mined archival Hubble Space Telescope data and performed large-scale data analysis to determine the physical properties of star systems.
- Implemented a machine learning algorithm (neural network) to perform fast classification of single and binary star systems based on their temporal brightness fluctuations.
- Authored (1) and Co-authored (4) papers in major astronomy and astrophysics journals.

EDUCATION

University of Maryland, College Park
PhD in Astronomy

May 2017

University of Maryland, College Park
M.S. in Astronomy

August 2013

Villanova University
B.S. in Astronomy & Astrophysics, Cum Laude
Minor in Physics

May 2011

PUBLICATIONS

Ballouz, Baresi, Crites, Kawakatsu, and Fujimoto. **The Sands of Phobos: The Martian moon's eccentric orbit refreshes its surface.** 2018. *Nature Geoscience*, In Review.

Lu, Ballouz, and Richardson. **Exploring Shear-free Ringlet Formation with Direct Simulations of Saturn's B Rings.** 2018. *Astronomical Journal* 156, 14pp.

Maurel, Ballouz, et al. (4 of 5). **Numerical Simulations of the contact between the lander MASCOT and a regolith-covered surface.** 2018. *Advances in Space Research*, 62, 2099-2124.

Thuillet, Ballouz, et al. (4 of 9). **Numerical modeling of lander interaction with a low-gravity asteroid regolith surface.** 2018. *Astronomy & Astrophysics*, 615, 41.

Zhang, Y., Ballouz, et al. (6 of 6). **Rotational Failure of Rubble-pile Bodies: Influences of Shear and Cohesive Strengths.** 2018. *Astrophysical Journal*, 857, 15-35.

Lauretta, Ballouz et al. (29 of 38). **OSIRIS-Rex: Sample Return from Asteroid (101955) Bennu.** 2017. *Space Science Reviews*, 212, 925-984.

Ballouz, et al. **Numerical Simulations of Saturn's B Ring: granular friction as a mediator between self-gravity wakes and viscous overstability.** 2017. *Astronomical Journal*, 153, 146-157.

Maurel, Ballouz, et al. (2 of 5). **Numerical simulations of oscillation-driven regolith motion: Brazil-nut Effect.** 2017. *MNRAS*, 464, 2866-2881.

Zhang, Ballouz, et al. (7 of 10). **Creep stability of the proposed AIDA mission target 65803 Didymos: I. Discrete cohesionless granular physics model.** 2017. *Icarus*, 98-123.

Perera, Jackson, Asphaug, and Ballouz. **The spherical Brazil Nut Effect and its significance to asteroids.** 2016, *Icarus*, 278, 194-203.

Ballouz, et al. **Numerical simulations of collisional disruption of rotating gravitational aggregates: Dependence on material properties.** 2015, *Planetary & Space Sciences*, 107, 29-35.

Yu, Ballouz, et al. (5 of 5). **Numerical predictions of surface effects during the 2029 close approach of Asteroid 99942 Apophis.** 2015. *Icarus*, 242, 82-96.

Matsumura, Ballouz, et al. (5 of 5). **The Brazil nut effect and its application to asteroids.** 2014. *Monthly Notices of the Royal Astronomical Society*, 443, 3368-3380.

Ballouz, et al. **Rotation-dependent Catastrophic Disruption of Gravitational Aggregates.** 2014. *Astrophysical Journal*, 789, 158-161.

Sion, Linell, Godon, and Ballouz. **The Hot Components of Am CVn Helium Cataclysmics.** 2011. *Astrophysical Journal*, 741, 63.

Mizusawa, Ballouz, et al. (3 of 9). **Far Ultraviolet Spectroscopy of Seven Nova-Like Variables.** 2010. *Publications of the Astronomical Society of the Pacific*, 122, 299.

Zellem, Ballouz, et al. (3 of 7). **Hubble Space Telescope STIS Spectroscopy of the Peculiar Nova-Like Variables BK Lyn, V751 Cygni, and V380 Oph.** 2009. *Publications of the Astronomical Society of the Pacific*, 121, 942.

Ballouz and Sion. **On the Accretion Rates of SW Sextantis Nova-like Variables.** 2009. *Astrophysical Journal*, 697, 1717-1724.

INVITED TALKS

(Co-author presentation) Crites, Ballouz, Baresi, Kawakatsu, Fujimoto. **The Shifting Sands of Phobos: Phobos' eccentric orbit triggers landslides on its surface.** Nagoya University Earth & Planetary Physics Seminar. Sept 14, 2018. Nagoya, Japan.

Ballouz, Baresi, Crites, Kawakatsu, Fujimoto. **The Shifting Sands of Phobos: Phobos' eccentric orbit triggers landslides on its surface.** Japan Geoscience Union. Regolith Science Session. May 22, 2018. Chiba, Japan

(Co-author Presentation) Walsh, Ballouz, Richardson, Michel, Jutzi, Durda, Schwartz, Barnouin, Hanus. **Large asteroid shapes from catastrophic disruption and reaccumulation.** 9th Workshop on Catastrophic Disruption in the Solar System (CD9). May 16, 2018. Kobe, Japan.

AWARDS

Dean's Merit Fellowship. University of Maryland. 2015

Chateaubriand Fellowship. Embassy of France in the United States of America. 2015

Goldhaber Travel Award. University of Maryland. 2014

John Chi-Lin Wang Award for Academic Excellence. University of Maryland. 2013

DPS Hartmann Travel Grant. American Astronomical Society 2013

Distinguished Teaching Assistant Award. University of Maryland. 2013

Cardelli Award for Outstanding Research. Villanova University. 2011

Falvey Scholar: Outstanding Undergraduate Research. Villanova University. 2011

Jenkins Scholarship Award. Villanova University. 2008

Bailey Scholarship Award. Villanova University. 2008