

EDUCATION

University of Maryland, College Park, MD, USA Aug. 2017 - Sept. 2022

Ph.D., Astronomy (2022) | **M.S.**, Astronomy (2019)

Dissertation: *On the Dynamics of Binary Asteroids Applied to DART Mission Target (65803) Didymos*

Advisor: Derek Richardson

University of California, Berkeley, CA, USA Aug. 2013 - May 2017

B.A., Physics | **B.A.**, Astrophysics

FELLOWSHIPS AND AWARDS

Dean's Fellow, UMD College of Computer, Mathematical, and Natural Sciences 2021
\$2,500 stipend.

Outstanding Research Assistant Award, UMD Graduate School 2020
Named among the top 2% of campus Graduate Assistants.

John Chi-Lin Wang Award, UMD Department of Astronomy 2020
Awarded to the third-year graduate student with the best overall performance in course grades, second-year research project, and qualifying exam.

Graduate School Dean's Fellowship, UMD 2017
\$10,000 graduate recruitment fellowship.

Jacob K. Goldhaber Travel Award, UMD 2022

Supplemental Travel Award, AAS Division of Dynamical Astronomy 2022

Student Travel Award, Binary Asteroids 5 Workshop 2019

Student Poster Award, Lawrence Livermore National Lab 2019

REFEREED PUBLICATIONS

First and Second Author:

5. **Agrusa, H. F.**, Ballouz, R., Meyer, A. J., Tasev, E., Noiset, G., Karatekin, Ö., Michel, P., Richardson, D. C., and Hirabayashi, M. **2022**. “[Rotation-induced Granular Motion on the Secondary Component of Binary Asteroids: Application to the DART Impact on Dimorphos](#)”. *Astronomy and Astrophysics* 664, L3, p. L3.
4. **Agrusa, H. F.**, Ferrari, F., Zhang, Y., Richardson, D. C., and Michel, P. **2022**. “[Dynamical Evolution of the Didymos-Dimorphos Binary Asteroid as Rubble Piles following the DART Impact](#)”. *The Planetary Science Journal* 3.7, 158, p. 158.
3. Richardson, D. C., **Agrusa, H. F.**, Barbee, B., Bottke, W. F., Cheng, A. F., Eggl, S., Ferrari, F., Hirabayashi, M., Karatekin, Ö., McMahon, J., Schwartz, S. R., Ballouz, R.-L., Bagatin, A. C., Dotto, E., Fahnestock, E. G., Fuentes-Muñoz, O., Gkolias, I., Hamilton, D. P., Jacobson, S. A., Jutzi, M., Lyzhoft, J., Makadia, R., Meyer, A. J., Michel, P., Nakano, R., Noiset, G., Raducan, S. D., Rambaux, N., Rossi, A., Sánchez, P., Scheeres, D. J., Soldini, S., Stickle, A. M., Tanga, P., Tsiganis, K., and Zhang, Y. **2022**. “[Predictions for the Dynamical States of the Didymos System Before and After the Planned DART Impact](#)”. *The Planetary Science Journal* 3.7, 157, p. 157.
2. **Agrusa, H. F.**, Gkolias, I., Tsiganis, K., Richardson, D. C., Meyer, A. J., Scheeres, D. J., Cuk, M., Jacobson, S. A., Michel, P., Karatekin, Ö., Cheng, A. F., Hirabayashi, M., Zhang, Y., Fahnestock, E. G., and Davis, A. B. **2021**. “[The Excited Spin State of Dimorphos Resulting from the DART Impact](#)”. *Icarus* 370, 114624, p. 114624.
1. **Agrusa, H. F.**, Richardson, D. C., Davis, A. B., Fahnestock, E., Hirabayashi, M., Chabot, N. L., Cheng, A. F., Rivkin, A. S., Michel, P., and DART Dynamics Working Group. **2020**. “[A Benchmarking and Sensitivity Study of the Full Two-body Gravitational Dynamics of the DART Mission Target, Binary Asteroid 65803 Didymos](#)”. *Icarus* 349, 113849, p. 113849.

N-th Author:

8. Meyer, A. J., Scheeres, D. J., **Agrusa, H. F.**, Noiset, G., McMahon, J., Karatekin, Ö., Hirabayashi, M., and Nakano, R. **2022**. “Energy Dissipation in Synchronous Binary Asteroids”. *The Planetary Science Journal* (submitted).

7. Statler, S. T., Raducan, S. D., Barnouin, O. S., DeCoster, M. E., Chesley, S. R., Barbee, B., **Agrusa, H. F.**, Cambioni, S., Cheng, A. F., Dotto, E., Eggl, S., Fahnestock, E. G., Ferrari, F., Graninger, D., Herique, A., Herreros, I., Hirabayashi, M., Ivanovski, S., Jutzi, M., Karatekin, Ö., Lucchetti, A., Luther, R., Makadia, R., Marzari, F., Michel, P., Murdoch, N., Nakano, R., Ormö, J., Pajola, M., Rivkin, A. S., Rossi, A., Sánchez, P., Schwartz, S. R., Soldini, S., Souami, D., and Stickle, A. **2022**. “After DART: Using the First Full-scale Test of a Kinetic Impactor to Inform a Future Planetary Defense Mission”. *The Planetary Science Journal* (submitted).
6. Nakano, R., Hirabayashi, M., **Agrusa, H. F.**, Ferrari, F., Meyer, A. J., Michel, P., Raducan, S. D., Sánchez, P., and Zhang, Y. **2022**. “[NASA’s Double Asteroid Redirection Test \(DART\): Mutual Orbital Period Change Due to Reshaping in the Near-Earth Binary Asteroid System \(65803\) Didymos](#)”. *The Planetary Science Journal* 3.7, 148, p. 148.
5. Kim, B. I., Boehm, R. D., and **Agrusa, H. F.** **2022**. “[Coil-to-Bridge Transitions of Self-Assembled Water Chains Observed in a Nanoscopic Meniscus](#)”. *Langmuir* 38.15, pp. 4538–4546.
4. Meyer, A. J., Gkolias, I., Gaitanas, M., **Agrusa, H. F.**, Scheeres, D. J., Tsiganis, K., Pravec, P., Benner, L. A. M., Ferrari, F., and Michel, P. **2021**. “[Libration-induced Orbit Period Variations Following the DART Impact](#)”. *The Planetary Science Journal* 2.6, 242, p. 242.
3. Rivkin, A. S., Chabot, N. L., Stickle, A. M., Thomas, C. A., Richardson, D. C., Barnouin, O., Fahnestock, E. G., Ernst, C. M., Cheng, A. F., Chesley, S., Naidu, S., Statler, T. S., Barbee, B., **Agrusa, H.**, Moskovitz, N., Terik Daly, R., Pravec, P., Scheirich, P., Dotto, E., Della Corte, V., Michel, P., Küppers, M., Atchison, J., and Hirabayashi, M. **2021**. “[The Double Asteroid Redirection Test \(DART\): Planetary Defense Investigations and Requirements](#)”. *The Planetary Science Journal* 2.5, 173, p. 173.
2. Zhang, Y., Michel, P., Richardson, D. C., Barnouin, O. S., **Agrusa, H. F.**, Tsiganis, K., Manzoni, C., and May, B. H. **2021**. “[Creep Stability of the DART/Hera Mission Target 65803 Didymos: II. The Role of Cohesion](#)”. *Icarus* 362, 114433, p. 114433.
1. Marohnic, J. C., Richardson, D. C., McKinnon, W. B., **Agrusa, H. F.**, DeMartini, J. V., Cheng, A. F., Stern, S. A., Olkin, C. B., Weaver, H. A., Spencer, J. R., and New Horizons Science Team. **2021**. “[Constraining the final merger of contact binary \(486958\) Arrokoth with soft-sphere discrete element simulations](#)”. *Icarus* 356, 113824, p. 113824.

SELECTED RESEARCH TALKS

N-body Shop Collaboration Annual Meeting	2022
AAS Division of Dynamical Astronomy Annual Meeting	2022
University of Maryland Aerospace Engineering Seminar (invited)	2022
Binary Asteroids 5 Workshop	2019
University of Maryland Planetary Astronomy Seminar (invited)	2019
Lawrence Livermore National Lab Summer Student Seminar	2019

PRESS COVERAGE

WIRED Magazine , Behold the Weird Physics of Double-Impact Asteroids , 2022
BBC World Service Newsday , NASA: Mission to smash into Dimorphos space rock launches , 2021
CW39 Houston/KIAH , NASA’s DART Mission kicks off with successful launch on its way to hit asteroid , 2021
Federal News Network , Redirecting an asteroid as practice ... just in case , 2021
iHeartRadio 610 WIOD , Live radio interview for launch of NASA’s DART Mission , 2021
MIT Technology Review , NASA is going to slam a spacecraft into an asteroid. Things might get chaotic. , 2021
Stories from a Space Journalist Podcast , Interview from Episode 4 , 2021
European Space Agency , Will DART make its target asteroid go wobbly? Hera will see , 2019
HPCwire Magazine , With the Help of HPC, Astronomers Prepare to Deflect a Real Asteroid , 2019

PROFESSIONAL SERVICE

Journal Referee	2022-present
<i>Astronomy & Astrophysics</i> (1), <i>Icarus</i> (1)	
Executive Secretary	2021
NASA Participating Scientist Program	

RESEARCH ADVISING

Alyssa Mazzone , UMD undergraduate <i>Binary asteroid formation via YORP spin-up</i> , co-advised with Derek Richardson	Spring 2022
Peter Santana , University of Puerto Rico at Mayagüez undergraduate <i>Formation of binary asteroids through gravitational reaccumulation</i>	Winter 2020 GRADMAP Winter Workshop
Meghna Sitaram , UMD undergraduate <i>Tidal dissipation in rubble-pile asteroids</i> , co-advised with Derek Richardson	Fall 2019 - Spring 2020

TEACHING EXPERIENCE

Teaching Assistantships:

ASTR 320: Theoretical Astrophysics , <i>U. of Maryland</i>	Spring, 2021
ASTR 101: Introduction to General Astronomy , <i>U. of Maryland</i>	Spring, 2020
ASTR 101: Introduction to General Astronomy , <i>U. of Maryland</i>	Spring, 2019
ASTR 415: Computational Astrophysics , <i>U. of Maryland</i>	Fall, 2018
ASTR 100/101: Introduction to General Astronomy , <i>U. of Maryland</i>	Fall, 2018
ASTR 220: Collisions in Space: The Threat of Asteroid Impacts , <i>U. of Maryland</i>	Spring, 2018
ASTR 100/101: Introduction to General Astronomy , <i>U. of Maryland</i>	Fall, 2017
Astro 12: The Planets , <i>UC Berkeley</i>	Spring, 2016
Astro 10: General Astronomy , <i>UC Berkeley</i>	Fall, 2016

Book Chapters:

3. Eiblum, D., Lee, E. C., Forman, M., Mann, N., **Agrusa, H. F.**, Kaplan-Cohen, M., Miller, W., Vishnubhotla, R., and Zheng, D. **2022**. *GED Ultimate Study Guide: for the Math-Phobic*. Gaithersburg, MD: Superlative Press.
2. Eiblum, D., Lee, E. C., Forman, M., Mann, N., **Agrusa, H. F.**, Kaplan-Cohen, M., Miller, W., Vishnubhotla, R., and Zheng, D. **2021**. *Praxis Core Math 5733: A Workbook for the Math Phobic*. Gaithersburg, MD: Superlative Press.
1. Eiblum, D., Lee, E. C., Forman, M., Mann, N., **Agrusa, H. F.**, Kaplan-Cohen, M., Miller, W., Vishnubhotla, R., and Zheng, D. **2020**. *Praxis Core Math 2020: A Complete Course*. Gaithersburg, MD: Superlative Press.

CONFERENCE PROCEEDINGS

16. **Agrusa, H.**, Richardson, D., Meyer, A., Barbee, B., Bottke, W., Cheng, A., Eggl, S., Ferrari, F., Hirabayashi, M., Karatekin, O., McMahon, J., Schwartz, S., and DART Dynamics Working Group. **2022**. "Predictions for the Dynamical State of the Didymos Binary System Before and After the DART Impact". *AAS/Division of Dynamical Astronomy Meeting*. Vol. 54. AAS/Division of Dynamical Astronomy Meeting, 200.05, p. 200.05.
15. **Agrusa, H. F.**, Richardson, D. C., Barbee, B., Bottke, W. F., Cheng, A. F., Eggl, S., Ferrari, F., Hirabayashi, M., Karatekin, O., McMahon, J., and Schwartz, S. R. **2022**. "Predictions for the Dynamical State of the Didymos System Before and After the Planned DART Impact". *LPI Contributions*. Vol. 2678. LPI Contributions, 2447, p. 2447.
14. Meyer, A. J., Scheeres, D. J., Gkolias, I. G., Gaitanas, M., **Agrusa, H. F.**, Tsiganis, K., Pravec, P., Benner, L. A. M., Ferrari, F., and Michel, P. **2022**. "Libration-Induced Orbit Period Variations Following the DART Impact". *LPI Contributions*. Vol. 2678. LPI Contributions, 2225, p. 2225.
13. Meyer, A., Scheeres, D., Gkolias, I., **Agrusa, H.**, and Tsiganis, K. **2021**. "Libration and Orbit Period Variation in Didymos Following the DART Impact". *AAS/Division for Planetary Sciences Meeting Abstracts*. Vol. 53. AAS/Division for Planetary Sciences Meeting Abstracts, 113.03, p. 113.03.
12. **Agrusa, H. F.**, Gkolias, I., Tsiganis, K., Richardson, D. C., Meyer, A., Scheeres, D. J., Davis, A. B., Fahnestock, E. G., Hirabayashi, M., and Michel, P. **2021**. "On the Post-Impact Spin State of the Secondary Component of the Didymos-Dimorphos Binary Asteroid System". *7th IAA Planetary Defense Conference*, 191, p. 191.
11. Zhang, Y., Michel, P., Richardson, D. C., **Agrusa, H. F.**, Tsiganis, K., Barnouin, O. S., and Karatekin, Ö. **2021**. "Minimum material strength of binary asteroid Didymos-Dimorphos from the perspective of structural stability". *7th IAA Planetary Defense Conference*, 202, p. 202.

10. Nakano, R., Hirabayashi, M., **Agrusa, H. F.**, Davis, A. B., Meyer, A., Yu, Y., Tsiganis, K., Barbee, B., Lyzhoft, J. R., Scheeres, D. J., Rossi, A., and Richardson, D. C. **2020**. “Dimorphos’ orbital perturbation induced by shape modification of Didymos after the DART impact”. *AGU Fall Meeting Abstracts*. Vol. 2020, NH037-0004, NH037-0004.
9. **Agrusa, H. F.**, Tsiganis, K., Gkolias, I., Richardson, D., Davis, A., Fahnestock, E., and Hirabayashi, M. **2020**. “On the post-impact spin state of the secondary component of the Didymos-Dimorphos binary asteroid system”. *AAS/Division for Planetary Sciences Meeting Abstracts*. Vol. 52. AAS/Division for Planetary Sciences Meeting Abstracts, 217.04, p. 217.04.
8. Marohnic, J. C., Richardson, D. C., McKinnon, W. B., **Agrusa, H. F.**, DeMartini, J. V., Cheng, A. F., Stern, S., Olkin, C. B., Weaver, H. A., Spencer, J. R., and New Horizons Science Team. **2020**. “Constraining the final merger of contact binary (486958) Arrokoth with soft-sphere discrete element simulations”. *AAS/Division for Planetary Sciences Meeting Abstracts*. Vol. 52. AAS/Division for Planetary Sciences Meeting Abstracts, 508.03, p. 508.03.
7. **Agrusa, H.**, Tsiganis, K., Gkolias, I., Richardson, D., Davis, A., Fahnestock, E., and Hirabayashi, M. **2020**. “[On the post-impact spin state of the secondary component of the Didymos-Dimorphos binary asteroid system](#)”. *European Planetary Science Congress*, EPSC2020-377, EPSC2020-377.
6. Marohnic, J. C., Richardson, D. C., McKinnon, W. B., **Agrusa, H. F.**, DeMartini, J. V., Cheng, A. F., Stern, S. A., Olkin, C. B., Weaver, H. A., and Spencer, J. R. **2020**. “[Constraining the final merger of contact binary \(486958\) Arrokoth with soft-sphere discrete element simulations](#)”. *European Planetary Science Congress*, EPSC2020-378, EPSC2020-378.
5. Zhang, Y., Michel, P., Richardson, D. C., Barnouin, O. S., **Agrusa, H. F.**, and Tsiganis, K. **2020**. “[Structural stability and cohesive strength of 65803 Didymos](#)”. *European Planetary Science Congress*, EPSC2020-660, EPSC2020-660.
4. Stickle, A. M., **Agrusa, H. F.**, DeCoster, M., Graninger, D., Owen, J. M., Raducan, S. D., Rosch, T., Collins, G. S., Bruck Syal, M., and DART Impact Modeling Working Group. **2020**. “Effects of Spacraft Geometry on Potential Deflection by Kinetic Impactor”. *51st Annual Lunar and Planetary Science Conference*. Lunar and Planetary Science Conference, 2339, p. 2339.
3. **Agrusa, H. F.**, Richardson, D. C., Davis, A. B., Fahnestock, E., and Hirabayashi, M. **2019**. “The Induced Libration of Didymos B Resulting from the DART Impact”. *AGU Fall Meeting Abstracts*. Vol. 2019, NH54B-08, NH54B-08.
2. Hirabayashi, M., Fahnestock, E., **Agrusa, H. F.**, Richardson, D. C., Stickle, A. M., Ernst, C. M., Sanchez, P., Thomas, C., Barnouin, O. S., Chabot, N. L., Rivkin, A., and Cheng, A. F. **2019**. “Finite element method approach for quantifying the conditions for shape deformation of the primary of binary asteroid Didymos after the DART impact”. *AGU Fall Meeting Abstracts*. Vol. 2019, NH51C-0792, NH51C-0792.
1. Richardson, D. C., Fahnestock, E., **Agrusa, H. F.**, Davis, A. B., Hamilton, D. P., Hirabayashi, M., Scheeres, D. J., Tancredi, G., Tsiganis, K., Yu, Y., Campo Bagatin, A., Cheng, A. F., and Michel, P. **2018**. “Simulations of the Pre- and Post-impact System Dynamics of the DART Mission Target Binary Asteroid 65803 Didymos”. *AGU Fall Meeting Abstracts*. Vol. 2018, P51A-04, P51A-04.