

# CURRICULUM VITAE

University of Idaho

**NAME:** Matthew Hedman

**DATE:** December 2022

**RANK OR TITLE:** Associate Professor

**DEPARTMENT:** Physics

**OFFICE LOCATION AND CAMPUS ZIP:**

Engineering/Physics Building Room 323  
U. Idaho, Moscow, Idaho 83844-0903

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**DATE OF FIRST EMPLOYMENT AT UI:** August 2013

**DATE OF TENURE:** Tenured 2019

**DATE OF PRESENT RANK OR TITLE:** August 2019

**EDUCATION BEYOND HIGH SCHOOL:**

<b>Degrees:</b> Ph.D.	Princeton University	Princeton NJ	2002, Physics
B.A.	Grinnell College	Grinnell IA	1996, Physics and Anthropology

**Certificates and Licenses:** N/A

**EXPERIENCE:**

**Teaching, Extension and Research Appointments:**

2019-Present Associate Professor at U. Idaho, Moscow ID  
2013-2019 Assistant Professor at U. Idaho, Moscow ID  
2015-Present Co-Investigator on the Europa Clipper Mission,  
2011-2018 Participating Scientist on the Cassini Mission,  
2011-2013 Senior Research Associate at Cornell University, Ithaca NY  
2004-2011 Research Associate at Cornell University, Ithaca, NY  
2002-2004 Research Fellow at the Kavli Institute for Cosmological Physics, Chicago IL  
1996-2002 Graduate Research Assistant at Princeton University, Princeton NJ

**Academic Administrative Appointments:** N/A

**Non-Academic Employment including Armed Forces:** N/A

**Consulting:** N/A

(List company/institute name, title, brief description, date)

**TEACHING ACCOMPLISHMENTS:** (Academic and Extension teaching)**Areas of Specialization:** Physics and Astronomy**Courses Taught:**

## University of Idaho:

2025 Spring PHYS 542 Electromagnetic Theory II  
 2025 Fall PHYS 541 Electromagnetic Theory I  
 2025 Fall PHYS200 Physics Seminar  
 2024 Spring PHYS 112. General Physics II  
 2023 Fall PHYS 103 General Astronomy  
 2023 Fall PHYS200 Physics Seminar  
 2022 Spring PHYS 542 Electromagnetic Theory II  
 2022 Fall PHYS 541 Electromagnetic Theory I  
 2022 Fall PHYS200 Physics Seminar  
 2021 Spring PHYS 112 General Physics II  
 2021 Fall PHYS103 General Astronomy  
 2021 Fall PHYS200 Physics Seminar  
 2021 Spring PHYS542 Electromagnetic Theory II  
 2020 Fall PHYS 541 Electromagnetic Theory I  
 2020 Spring PHYS 112 General Physics II  
 2019 Fall PHYS 103 General Astronomy  
 2019 Spring PHYS 342 Electromagnetic Fields II  
 2019 Spring PHYS 542 Electromagnetic Theory II  
 2018 Fall. PHYS 541 Electromagnetic Theory I  
 2018 Spring PHYS 211 Engineering Physics I  
 2018 Spring PHYS499 Relativistic Physics  
 2017 Fall PHYS 103 General Astronomy  
 2017 Spring PHYS 542 Electromagnetic Theory II  
 2016 Fall PHYS 541 Electromagnetic Theory I  
 2016 Spring PHYS 541 Electromagnetic Theory II  
 2015 Fall PHYS 103 General Astronomy  
 2015 Spring PHYS 541 Electromagnetic Theory I  
 2014 Fall PHYS 542 Electromagnetic Theory II  
 2013 Spring PHYS 541 Electromagnetic Theory I

## Cornell University

2012 Fall ASTR 1102 Our Solar System (with S. Squyres)

**SCHOLARSHIP ACCOMPLISHMENTS:** (Including scholarship of teaching and learning, artistic creativity, discovery, and application/integration)

**Publications, Exhibitions, Performances, Recitals:**

**---Published since arriving at U. Idaho**

**Refereed/Adjudicated (6)**

[6] **M.M. Hedman**. 2023. A planetary ring in a surprising place. *Nature* 614:232-233

[5] J. F. Carbary, **M.M. Hedman**, T.W. Hill, X. Jia, W. Kurth, L. Lamy, G. Provan, 2019. The mysterious periodicities of Saturn: Clues to the rotation rate of the planet for *Saturn in the 21<sup>st</sup> Century* by K. Baines, M. Flasar, N. Krupp and T. Stallard (eds.), Cambridge

[4] F. Postberg, A.J. Coates, R.N. Clark, C. Dalle Ore, C.J. Hansen, **M.M. Hedman**, F. Scipioni, J.H. Waite Jr., 2018. Plume and Surface Composition of Enceladus for *Enceladus and the Icy Moons of Saturn* by P.M. Schenk, R.N. Clark, C.J.A. Howett, A.J. Verbiscer, J.H. Waite Jr (eds), University of Arizona.

[3] D.B. Goldstein, **M.M. Hedman**, M. Manga, M. Perry, J. Schmidt, J. Spitale, B. Teolis, 2018. Plume Dynamics for *Enceladus and the Icy Moons of Saturn* by P.M. Schenk, R.N. Clark, C.J.A. Howett, A.J. Verbiscer, J.H. Waite Jr (eds), University of Arizona.

[2] **M.M. Hedman**, 2018, An Introduction to Planetary Ring Dynamics for *Planetary Rings Systems* by M.S. Tiscareno and C. Murray (eds.), Cambridge

[1] **M.M. Hedman**, S. Hsu, F. Postberg, S. Renner, D. Hamilton and C. Mitchell, 2018, Dusty Rings for *Planetary Rings Systems* by M.S. Tiscareno and C. Murray (eds.), Cambridge

**Peer Reviewed/Evaluated (94)**

[94] D.L. Blaney, K. Hibbitts, S. Diniega, A.G. Davies, R.N. Clark, R.O. Green, **M.M. Hedman**, Y. Langevin, J. Lunine, T.B. McCord, S. Murchie, C. Paranicas, F. Seelos, J.M. Soderblum, M.L. Cable, R. Eckert, D.R. Thompson, S.K. Trumbo, C. Bruce, S.R. Lundeen, H.A. Bender, M.C. Helmlinger, L.B. Moore, P. Mouroulis, Z. Small, H. Tang, B. Van Gorp, P.W. Sullivan, S. Zareh, J.I. Rodriguez, I. McKinley, D.V. Hahn, M. Bowers, R. Hourani, B.A. Bryce, D. Nuding, Z. Bailey, A. Rettura, E.D. Zarate. 2024 The Mapping Imaging Spectrometer for Europa (MISE). *Space Science Reviews* 220:80. *Contributed text and figures regarding potential plume observations with MISE.*

[93] M. Ciarniello, G. Filacchione, P.D. Nicholson, **M.M. Hedman**, S. Charnoz, J.N. Cuzzi, M. El Moutamid, A.R. Hendrix, N. Rambaux, K.E. Miller O. Mousis, K. Baillie, P.R. Estrada, J.H. Waite (2024) The Origin and Composition of Saturn's Ring Moons. *Space Science Reviews* 220:72. *Contributed figures and text regarding trends in spectral properties across the small moons.*

[92] K.E. Miller, G. Filacchione, J.N. Cuzzi, P.D. Nicholson, **M.M. Hedman**, K. Baillie, R.E. Johnson, W.-L. Tseng, P.R. Estrada, J.H. Waite, M. Ciarniello, C. Ferrari, Z. Zhang, A. Hendrix, J.I. Moses, H.-W. Hsu. (2024) The Composition of Saturn's Rings. *Space Science Reviews* 220:72. *Contributed figures and text on the composition of the D ring and reviewed overall text.*

[91] R.J. Cartwright, B.J. Holler, W.M. Grundy, S.C. Tegler, M. Neveu, U. Raut, C.R. Glein, T.A. Nordheim, J.P. Emery, J.C. Castillo-Rogez, E. Quirico, S. Protopapa, C.B. Beddingfield, **M.M. Hedman**, K. de Kleer, R.A. DeColibus, A.N. Morgan, R. Wochner, K.P. Hand, G.L. Villanueva, S. Faggi, N. Pinilla-Alonso, D.E. Trilling, M.M. Mueller. 2024. JWST Reveals CO Ice, Concentrated CO<sub>2</sub> Deposits, and Evidence for Carbonates Potentially Sourced from Ariel's Interior. *ApJL* 970:L29. *Contributed some thoughts on the interpretation of spectral features.*

[90] T.M. Becker, M.Y. Zolotov, M.S. Gudipati, J.M. Soderblom, M.A. McGrath, B.L. Henderson, **M.M. Hedman**, M. Choukroun, R.N. Clark, C. Chivers, N.S. Wolfenbarger, C.R. Glein, J.C. Castillo-Rogez, O. Mousis, K.M. Scanlan, S. Diniega, F.P. Seelos, W. Goode, F. Postberg, C. Grima, H.-W. Hsu, L. Roth, S.K. Trumbo, K.E. Miller, K. Chan, C. Paranicas, S.M. Brooks, K.M. Soderlund, W.B. McKinnon, C.A. Hibbits, H.T. Smith, P.M. Molyneux, G.R. Gladstone, M.L. Cable, K.P. Hand, S.D. Vance, S.M. Howell, L.C. Quick, I. Mishra, A.M. Rymer, C. Briois, D.L. Blaney, U. Raut, J.H. Waite, K.D. Retherford, E. Shock, P. Withers, J.H. Westlake, I. Jun, K.E. Mandt, B.J. Buratti, H. Korth, R.T. Pappalardo, the Europa Clipper Working Group. 2024. Exploring the Composition of Europa with the Upcoming Europa Clipper Mission. *SSR* 220:49. *Contributed text on Clipper plume observations.*

[89] K. Denny, **M.M. Hedman**, D. Bockelee-Morvan, G. Filacchione, F. Capaccioni. 2024. Constraining Time Variations in Enceladus's Water-vapor Plume with Near-Infrared Spectra from Cassini's Visual and Infrared Mapping Spectrometer *PSJ* 5:144. *Supervisor for paper led by Graduate student, reviewed paper and supported analysis.*

[88] **M.M. Hedman**, M.S. Tiscareno, M.R. Showalter, L.N. Fletcher, O.R.T. King, J. Harkett, M.T. Roman, N. Rowe-Gurney, H.B. Hammel, S.N. Milam, M. El Moutamid, R.J. Cartwright, I. de Pater, E.M. Molter. 2024 Water-Ice Dominated Spectra of Saturn's Rings and Small Moons. *JGR Planets* 129:e2023JE008236. *Led the data analysis and the writing of this paper.*

[87] I.J. Daubar, A.G. Hayes, G.C. Collins, K.L. Craft, J.A. Rathbun, J.R. Spencer, D.Y. Wyrick, M.T. Bland, A.G. Davies, C.M. Ernst, S.M. Howell, E.J. Leonard, A.S. McEwen, J.M. Moore, C.B. Phillips, L.M. Prockter, L.C. Quick, J.E.C. Scully, J.M. Soderblom, S.M. Brooks, M. Cable, M.E. Cameron, K. Chan, C.J. Chivers, M. Choukroun, C.J. Cochrane, S. Diniega, A.J. Dombard, C.M. Elderm, C. Gerekos, C. Glein, T.K. Greathouse, C. Grima, M.S. Gudipati, K.P. Hand, C. Hansen, P. Hayne, **M.M. Hedman**, K. Hughson, X. Jia, J. Lawrence, H.M. Meyer, J. Miller, R. Parekh, G.W. Patterson, D.M. Persaud, S. Piqueux, K.D. Retherford, K.M. Scanlan, R. Schenk, B. J. Buratti, H. Korth, D. Senske, R. Pappalardo. 2024. Planned Geological Investigations of the Europa Clipper Mission. *Space Science Reviews* 220:18. *Contributed some text on Clipper plume observations.*

[86] R.G. French, **M.M. Hedman**, P.D. Nicholson, P.-Y. Longaretti, C.A. McGhee-French, 2024. The Uranus system from occultation observations (1977-2006): Rings, pole direction, gravity field and masses of Cressida, Cordelia and Ophelia. *Icarus* 411:115957. *Contributed to the interpretation of these results (particular for the masses of the satellites) and wrote some of the text in this paper.*

[85] L.B. Fletcher, O.R.T. King, J. Harkett, H.B. Hammel, M.T. Roman, H. Melin, **M.M. Hedman**, J.I. Moses, S. Guerlet, S.N. Milam, M.S. Tiscareno. 2023. Saturn's atmosphere in northern summer revealed by JWST/MIRI *JGR Planets* 128:e2023JE007924. *Helped with some aspect of the data processing based on experience with other observations.*

[84] R.G. French, P.D. Nicholson, C.A. McGhee-French, P.-Y. Longaretti, **M.M. Hedman**, J. Colwell, E.A. Marouf, N. Rappaport, S. Flury, J. Fong, R. Maguire, G. Steranka. 2023. The complex shape of the outer edge of Saturn's B ring, as observed in Cassini occultation data. *Icarus* 405:115678. *Contributed to the interpretation of these variations and to some of the text in the paper.*

[83] J.H. Roberts, W.B. McKinnon, C.M. Elder, G. Tobie, J.B. Biersteker, D. Young, R.S. Park, G. Steinbrugge, F. Nimmo, S.M. Howell, J.C. Castillo-Rogez, M.L. Cable, J.N. Abrahams, M.T. Blans, C. Chivers, C.J. Cochrane, A.J. Dombard, C. Ernst, A. Genova, C. Gerekos, C. Glein, C.D. Harris, H. Hay, P.O. Hayne, **M.M. Hedman**, H. Hussman, X. Jia, K. Khurana, W.S. Kiefer, R. Kirk, M. Kivelson, J. Lawrence, E.J. Leonard, J.I. Lunine, E. Mazaico, T.B. McCord, A. McEwen, C. Paty, L.C. Quick, C.A. Raymond, K.D. Retherford, L. Roth, A. Rymer, J. Saur, K. Scanlan, D.M. Schroeder, D.A. Senske, W. Shao, K. Soderlund, E. Spiers, M.J. Styczinski, P. Tortora, S.D. Vance, M.N. Villarreal, B.P. Weiss, J.H. Westlake, P. Withers, N. Woldenbarger, B. Buratti, H. Korth, R.T. Pappalardo. 2023. The Interior Thematic Working Group: Exploring the Interior of Europa with Europa Clipper. *Space Science Reviews* 219:46. *Contributed some text on Clipper plume observations.*

[82] I. de Pater, E. Lellouch, D.F. Strobel, K. de Kleer, T. Fouchet, M.H. Wong, B.J. Holler, J.

Stansberry, P.M. Fry, M.E. Brown, D. Bockelee-Morvan, S.K. Trumbo, L.N. Fletcher, **M.M. Hedman**, E.M. Molter, M. Showalter, M.S. Tiscareno, S. Cazaux, R. Hueso, S. Luszcz-Cook, H. Melin, C. Moeckel, A. Mura, G. Orton, L. Roth, J. Saur, F. Tosi. 2023. An energetic eruption with associated SO 1.707 micron emissions at Io's Kanehekili fluctus and a brightening event at Loki patera observed by JWST. *JGR Planets* 128:8 e2023JE007872. *Provided some help with processing JWST NIRSpec data based on other observations.*

[81] *H. Sharma*, **M.M. Hedman**, S. Vahidinia. 2023, New insights into variations in Enceladus plume particle launch velocities from Cassini-VIMS spectral data. *PSJ* 4:106. *Supervisor for paper led by Graduate student, reviewed paper and supported analysis.*

[80] **M.M. Hedman**, I. Regan, T. Becker, S.M. Brooks, I. de Pater, M. Showalter. 2023. Examining Uranus' Zeta ring in Voyager 2 wide-angle-camera Observations. Quantifying the ring's Structure in 1986 and its Modifications prior to the year 2007. *PSJ* 4:104. *Led the data analysis and the paper writing.*

[79] G.L. Villanueva, H.B. Hammel, S.N. Milam, V. Kofman, S. Faggi, C.R. Glein, R. Cartwright, L. roth, K.P. Hand, L. Paganini, J. Spencer, J. Stansberry, B. Holler, N. rowe-Gurney, S. Protopapa, G. Strazzulla, G. Luzzi, G. Cruz-Mermy, M. El Moutamid, **M.M. Hedman**, K. Denny 2023. *Nature Astronomy* 7:1056-1062. *Along with Graduate Student K. Denny we helped validate the detection of the water vapor in the Enceladus plume using comparisons with Cassini-VIMS data.*

[78] A.A. Simon, **M.M. Hedman**, P.D. Nicholson, M.R. Showalter, S. Callos. 2023. Hubble detects start of a new Saturn ring spoke season. *GRL* 50:e2022GL101904. *Along with UG student S. Callos, contributed to writing by helping to put these Hubble observations in context with Cassini data we are currently analyzing.*

[77] P.D. Nicholson, R.G. French, C.A. McGhee-French, P.-Y. Longaretti, **M.M. Hedman**, M. El Moutamid, J. Colwell, E.A. Marouf, N. Rappaport, S. Flury, J. Fong, R. Maguire, G. Steranka. 2023. The seven-lobed shape of the outer edge of Saturn's A ring. *Icarus* 390:115287. *Contributed to discussions regarding the variations in the A-ring's shape their potential implications.*

[76] *J.A. A'Hearn*, **M.M. Hedman**, C.R. Mankovich, H. Aramona, M. S. Marley. 2022. Ring Seismology of the Ice Giants Uranus and Neptune *PSJ* 3:194. *Supervisor for paper led by graduate student, reviewed paper and supported analysis.*

[75] C. Paranicas, E. Roussos, K. Dialynas, P. Kollmann, N. Krupp, **M.M. Hedman**, R.C. Allen, G. Hospodarsky. 2022. The Electric Field outward of Saturn's Main Rings *ApJ* 934:11. *Just contributed some general thoughts on the topic and some suggestions on a draft of the paper.*

[74] **M.M. Hedman**, P.D. Nicholson, M. El Moutamid, S. Smotherman. Reading the Recent History of Saturn's Gravity Field in its Rings. *PSJ* 3:61. *Performed analysis, developed theory and wrote most of this paper, based in part on work done by former student S. Smotherman.*

[73] I.J. Cohen, C. Beddingfield, R. Chancia, G. DiBraccio, **M.M. Hedman**, S. MaKenzie, B. Mauk, K.M. Sayanagi, K.M. Soderlund, E. Turtle, C. Ahrens, C.S. Arridge, S.M. Brooks, E. Bunce, S. Charnoz, A. Coustenism R.A. Dillman, S. Dutta, L.N. Fletcher, R. Harbison, R. Helled, R. Holme, L. Jozwiak, Y. Kasaba, P. Kollmann, S. Luszcz-Cook, K. Mandt, O. Moussism A. Mura, G. Murakami, M. Parisim A. Rymer, S. Stanley, K. Stephan, R.J. Vervack, M.H. Wong, P. Wurz 2022 The Case for a New Frontiers-Class Uranus Orbiter: System Science at an Underexplored and Unique World with a Mid-scale Mission. *PSJ* 3:58. *Along with former student R. Chancia, wrote material related to the rings science goals of this mission concept.*

[72] M. Parisi, M. Vaquero, **M.M. Hedman**, M.S. Tiscareno. 2022. Gravity Investigation of Saturn's Inner System with the Innovative Skimmer Concept. *PSJ* 3:19. *Contributed to discussion of how the gravitational constraints near the F ring could clarify population of moonlets in this ring. Reviewed entire paper.*

[71] *H. Sharma, M.M. Hedman, D.H. Wooden, A. Colaprete, A.M. Cook. 2021. Constraining Low-Altitude Lunar Dust using the LADEE-UVS Data JGR-Planets 126:e2021JE006935 Supervisor for paper led by graduate student, reviewed paper and supported analysis.*

[70] *R.G. French, B. Bridges, M.M. Hedman, P.D. Nicholson, C. Mankovich, C.A. McGhee-French. 2021. Kronoseismology V: A panoply of waves in Saturn's C ring driven by high-order planetary oscillations. Icarus 370:114660. Work inspired by discoveries made by former student B. Bridges. Confirmed findings and analysis by first author, reviewed paper.*

[69] *A.M. Rymer, K.D. Runyon, B. Clyde, J.I. Núñez, R. Nikoukar, K.M. Soderlund, K. Sayanagi, M. Hofstetter, L.C. Quick, S. Alan Stern, T. Becker, M.M. Hedman, I. Cohen, F. Crary, J.J. Fortney, J. Vertesi, C. Hansen, I. de Pater, C. Paty, T. Spilker, T. Stallard, G.B. Hospodarsky, H. Todd Smith, H. Wakeford, S.E. Moran, A. Annex, P. Schenk, M. Ozimek, J. Arrieta, R.L. McNutt, Jr., A. Masters, A.A. Simon, S. Ensor, C.T. Aplan, J. Bruzzi, D.A. Pathoff, C. Scott, C. Campo, C. Keupiarz, C.J. Cochrane, C. Gantz, D. Rodriguez, D. Gallagher, D. Hurley, D. Crowley, E. Abel, E. Provornikova, E.P. Turtle, G. Clark, J. Wilkes, J. Hunt, J.H. Roberts, J. Rehm, K. Murray, L. Wolfrath, L.N. Fletcher, L. Spilker, E.S. Martin, M. Parisi, M. Norkus, N. Izenberg, R. Stough, R.J. Vervack, Jr., K. Mandt, K.B. Stevenson, S. Kijewski, W. Cheng, J.D. Feldman, G. Allen, D. Prabhu, S. Dutta, C. Young, J. Williams. 2021. Neptune Odyssey: A Flagship Concept for the Exploration of the Neptune-Trion System. PSJ 2:184. Participated in the study that led to this mission concept, providing expertise on rings and small moons. Helped write Section 4.*

[68] *M.M. Hedman, M. Young. 2021. Evidence that a Novel Type of Satellite Wake Might Exist in Saturn's E Ring. PSJ 2:127. Performed analysis and wrote paper based on discoveries made by former student M. Young*

[67] *M.M. Hedman, R.O. Chancia. 2021. Uranus' Hidden Narrow Rings PSJ 2:107. Performed analysis and wrote paper based on discoveries made by former student R.O. Chancia*

[66] *J.A. A'Hearn, M.M. Hedman, D.P. Hamilton. 2021. Modeling Saturn's D68 Clumps as a Co-orbital Satellite System PSJ 2:74. Supervisor for paper led by graduate student, , reviewed paper and supported analysis*

[65] *M.M. Hedman, B. Bridges. 2020. Changes in a dusty ringlet in the Cassini Division after 2010. PSJ 1:43.*

[64] *L.C. Quick, A. Roberge, A. Barr-Milnar, M.M. Hedman. 2020. Forecasting rates of volcanic activity on terrestrial exoplanets and implications for cryovolcanic activity on extrasolar ocean worlds. PASP 132:1014.*

[63] *R.G. Jrousek, J.E. Colwell, M.M. Hedman, R.G. French, E.A. Marouf, L.W. Esposito, P.D. Nicholson. 2020. Saturn's C ring and Cassini Division: Particle sizes from Cassini UVIS, VIMS and RSS occultations. Icarus 344:113365.*

[62] *P.D. Nicholson, T. Ansty, M.M. Hedman, D. Creel, J. Ahlers, R.A. Harbison, R.H. Brown, R.N. Clark, K.H. Baines, B.J. Buratti, C. Sotin, S. V. Badman. 2020. Occultation observations of Saturn's rings with Cassini VIMS Icarus 344:113356.*

[61] *M.M. Hedman, P. Helfenstein, R.O. Chancia, P. Thomas, E. Roussos, C. Paranicas, A.J. Verbiscer. 2020. Photometric analyses of Saturn's small moons: Aegaeon, Methone and Pallene are dark; Helene and Calypso are bright. AJ 159:129.*

[60] *S.M. Kreyche, J.W. Barnes, B.L. Quarles, J.J. Lissauer, J.E. Chambers, M.M. Hedman 2020. Retrograde-rotating exoplanets experience obliquity excitations in an eccentricity-enabled resonance. PSJ 1:8.*

[59] *L.C. Quick, M.M. Hedman. 2020. Characterizing deposits emplaced by cryovolcanic plumes on*

Europa. *Icarus* 343:113667

[58] R.G. French, C.A. McGhee-French, P.D. Nicholson, **M.M. Hedman**, N.J. Rappaport, E.A. Marouf, P.-Y. Longaretti, J. Hahn. 2020. Unusual one-armed density waves in the Cassini Division of Saturn's rings. *Icarus* 339:113600

[57] K.E. Miller, J.H. Waite, Jr., R.S. Perryman, M.E. Perry, A. Bouquet, B.A. Magee, B. Solton, T. Brockwell, **M.M. Hedman**, C.R. Glein. 2020. Cassini INMS constraints on the composition and latitudinal fractionation of Saturn ring rain material. *Icarus* 339:113595.

[56] M. Hofstadter, A. Simon, S. Atreya, D. Banfield, J.J. Fortney, A. Hayes, **M.M. Hedman**, G. Hospodarsky, K. Mandt, A. Masters, M. Showalter, K.M. Soderlund, D. Turrini, E. Turtle, K. Reh, J. Elliot, N. Arora, A. Petropoulos, The Ice Giant Mission Study Team. 2019. Uranus and Neptune missions: A study in advance of the next Planetary Science Decadal Survey. *P&SS* 177:104680

[55] R.D. Dhirga, J.W. Barnes, **M.M. Hedman**, J. Radebaugh, 2019. Using Elliptical Fourier Descriptor Analysis (EFDA) to Quantify Titan Lake Morphology. *ApJ* 158:6

[54] J.A. A'Hearn, **M.M. Hedman**, M. El Moutamid, 2019. Dynamics of multiple bodies in a corotation resonance: Conserved quantities and relevance to ring arcs. *ApJ* 882:66

[53] M.S. Tiscareno, P.D. Nicholson, J.N. Cuzzi, L.J. Spilker, C.D. Murray, **M.M. Hedman**, J.E. Colwell, J.A. Burns, S.M. Brooks, R.N. Clark, N.J. Cooper, E. Deau, C. Ferrari, G. Filacchione, R.G. Jerousek, S. Le Mouelic, R. Morishima, S. Piorz, S. Rodriguez, M.R. Showalter, S.V. Badman, E.J. Baker, B.J. Buratti, K.H. Baines, C. Sotin. 2019. Close-range remote sensing of Saturn's rings during Cassini's ring-grazing orbits and Grand Finale. *Science* 364:eaau1017

[52] S.M. MacKenzie, J.W. Barnes, J.D. Hofgartner, S.P.D. Birch, **M.M. Hedman**, A. Lucas, S. Rodriguez, E.P. Turtle, C. Sotin. 2019. The case for seasonal surface changes at Titan's lake district. *Nature Astronomy* 3:506-510.

[51] R.O. Chania, **M.M. Hedman**, S.W.H. Cowley, G. Provan, S.-Y. Ye. Seasonal structures in Saturn's dusty Roche Division correspond to periodicities of the planet's magnetosphere. *Icarus* 330:230-255.

[50] **M.M. Hedman**. 2019. Using cosmogenic Lithium, Beryllium and Boron to determine the surface ages of icy objects in the outer solar system. *Icarus* 330:1-4.

[49] **M.M. Hedman**, P.D. Nicholson, 2019. Axisymmetric density waves in Saturn's rings. *MNRAS* 485:13-29.

[48] **M.M. Hedman**, 2019. Bright clumps in the D68 ringlet near the end of the Cassini Mission. *Icarus* 323:62-75.

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[6] D. Barkats, C. Bischoff, P. Farese, L. Fitzpatrick, T. Gaier, J.O. Gundersen, **M.M. Hedman**, L. Hyatt, J.J. McMahon, D. Samtleben, S.T. Staggs, K. Vanderlinde, B. Winstein, 2005, First measurements of the polarization of the Cosmic Microwave Background Radiation at small angular scales from CAPMAP, *The Astrophysical Journal*, 619:L127-L130

[5] D. Barkats, C. Bischoff, P. Farese, T. Gaier, J.O. Gundersen, **M.M. Hedman**, L. Hyatt, J.J. McMahon, D. Samtleben, S.T. Staggs, E. Stefanescu, K. Vanderlinde, B. Winstein, 2005, Cosmic Microwave Background polarimetry using correlation receivers with the PIQUE and CAPMAP Experiments, *The Astrophysical Journal Supplementi*, 159:1-26

[4] W. Hu, **M.M. Hedman**, M. Zaldarriaga, 2003, Benchmark parameters for CMB polarization experiments, *Physical Review D* 67:043004

[3] A. de Oliveira-Costa, M. Tegmark, M. Zaldarriaga, D. Barkats, J.O. Gundersen, **M.M. Hedman**, S.T. Staggs, B. Winstein, 2003, First attempt at measuring the CMB cross-polarization, *Physical Review D* 67:023003

[2] **M.M. Hedman**, D. Barkats, J.O. Gundersen, J.J. McMahon, S.T. Staggs and B. Winstein; 2002, New limits on the polarized anisotropy of the Cosmic Microwave Background at subdegree angular scales, *The Astrophysical Journal*, 573:L73-L76

[1] **M.M. Hedman**, D. Barkats, J.O. Gundersen, S.T. Staggs and B. Winstein, 2001, A limit on the polarized anisotropy of the Cosmic Microwave Background at subdegree angular scales, *The Astrophysical Journal*, 548:L111-L114

**Other:** (reports, proceedings, papers, citations and references, performances) NONE

**Presentations and Other Creative Activities:** (i.e. slide sets, web pages, video productions, etc., provide date and location)

The forces that sculpt Saturn's rings. August 2010 Cassini CHARM telecom

A new perspective on Saturn's rings November 2006 Cassini CHARM telecon

**Professional Meeting Papers, Workshops, Showings, Recitals:** (provide date and location)

---Presented since arriving at U. Idaho (78, group members shown in italics)

[78] *V. Afigbo*, **M.M. Hedman**, P.D. Nicholson, R.G. French, C.R. Mankovich, R. Jerousek, J. Dewberry. Weighing Snowballs: Resonant responses to satellite and planetary perturbations reveal secrets of Saturn's C ring. 2024 meeting of the American Geophysical Union

[77] *V. Afigbo*, **M.M. Hedman**, P.D. Nicholson, R.G. French, C.R. Mankovich, R. Jerousek, J. Dewberry. Echoes from the Depths: Investigating Saturn's Interior using Ring Seismology. 2024 meeting of the American Geophysical Union

[76] **M.M Hedman**, M.T. Roman, I. de Pater, H.B. Hammel, R. Cartwright, R.G. French, P.D. Nicholson, M.T. Roman, M. El Moutamid. New insights into the structure and spectra of the Uranian rings from JWST. 2024 meeting of the American Geophysical Union.

[75] **M.M Hedman**, M.S. Tiscareno, I. de Pater, H.B. Hammel, R. Cartwright, R.G. French, P.D. Nicholson, M.T. Roman, M. El Moutamid. New insights into the spectra and structure of the Uranian rings from JWST. 2024 meeting of the Division for Planetary Sciences.

[74] **M.M. Hedman**, T.M. Becker, S.M. Brooks, R.J. Cartwright, I. de Pater, M. El Moutamid, R.G. French, S. Hsu, R.G. Jerousek, P.D. Nicholson, D. Souami, M.S. Tiscareno. Science Drivers for Observations of the Uranian Rings and Inner Moons. 2024 GSFC Workshop on the Uranus Flagship Mission.

[73] *V. Afigbo*, **M.M. Hedman**, P.D. Nicholson, M. El Moutamid. Resonant responses to planetary normal modes reveals some secrets of Saturn's C ring. 2024 meeting of the Division for Dynamical Astronomy.

[72] **M.M. Hedman**, M.T. Roman, N. Rowe-Burney, I. de Pater, M. Showalter, M. El Moutamid, M. Tiscareno. Unexpected structures in Uranus' gamma ring. 2024 meeting of the Division for Dynamical Astronomy.

[71] *V. Afigbo*, **M.M. Hedman**, P.D. Nicholson, R.G. French. Unveiling what makes Saturn ring: A quest to quantify Saturn's planetary normal-mode oscillations through ring seismology. 2023 meeting of the Division for Planetary Sciences

[70] **M.M. Hedman**, P.D. Nicholson, R.G. French, M.R. Showalter. Resonantly-generated patterns in the Uranian Rings. 2023 meeting of the Division for Planetary Sciences

[69] **M.M. Hedman**, R. Cartwright, M. Cuk, R.S. French, L. Spilker, S.M. Brooks. How Uranus' small inner moons can help us better understand the origins and evolution of the Uranian system. 2023 Uranus Flagship mission meeting.

[68] **M.M. Hedman**, M.S. Marley, C.R. Mankovich, J.W. Dewberry, *R.O. Chancia*, P.D. Nicholson. Using the Uranian ring system to probe the interior of an Ice Giant. 2023 Uranus Flagship mission meeting.

[67] **M.M. Hedman**. The infrared spectra of Saturn's rings from JWST. 2023 STScI Spring Symposium.

[66] **M.M. Hedman**, R.G. French, P.D. Nicholson, M.R. Showalter. Resonantly-generated brightness variations in the Uranian rings seen in Voyager 2 images. 2023 Meeting of the Division for Dynamical Astronomy.

[65] **M.M. Hedman**, The Uranian Ring-Moon System. 2022 Fall Meeting of the American Geophysical Union (invited).

[64] *H. Sharma*, **M.M. Hedman**, S. Vahidinia. New Insights into Enceladus Plume Particle Launch Velocities. 2022 Fall Meeting of the American Geophysical Union.

[63] *V. Afigbo*, **M.M. Hedman**. What Makes Saturn Ring? A Quest to Quantify the Amplitudes of Saturn's Planetary Normal-Mode Oscillations using Ring Seismology. 2022 Fall Meeting of the American Geophysical Union.

[62] *S. Callos*, **M.M. Hedman**, D. Hamilton. A Comprehensive Survey of Spokes in Cassini Images of Saturn's B ring. 2022 meeting of the Division for Planetary Sciences.

[61] **M.M. Hedman**, I. Regan, T. Becker, S. Brooks, S. Jarmak. New information about Uranus' dusty rings from Voyager 2 images. 2022 meeting of the Division for Planetary Sciences

- [60] *K. Denny, M.M. Hedman, D. Bockelee-Morvan, G. Filacchione, F. Capaccioni.* Possible Water Vapor Emission Feature in Near-Infrared Enceladus Plume Spectra from Cassini-VIMS. 2022 meeting of the Division for Planetary Sciences.
- [59] *J.A. A'Hearn, M.M. Hedman, C. Mankovich, H. Aramona, M.S. Marley.* Ring Seismology of the Ice Giants Uranus and Neptune. 2022 meeting of the Division for Dynamical Astronomy.
- [58] *M.M. Hedman, P.D. Nicholson, M. El Moutamid.* Using disk structures as historical records: A case study involving Saturn's rings. 2022 meeting of the Division for Dynamical Astronomy.
- [57] *H. Sharma, M.M. Hedman, S. Vahidinia.* Variations in the Near-Infrared Spectra of Enceladus. 2021 meeting of the American Geophysical Union (virtual)
- [56] *J.A. A'Hearn, M.M. Hedman, C. Mankovich, M. Marley.* Ice Giant Ring Seismology. 2021 meeting of the American Geophysical Union (virtual)
- [55] *M.M. Hedman.* Resonant phenomena in the Saturn System. 2021 XX Brazilion Colloquium of Orbital Dynamics (invited, virtual)
- [54] *H. Sharma, M.M. Hedman, S. Vahidinia.* Variations in the Near-Infrared Spectra of Enceladus. 2021 meeting of the Division for Planetary Sciences (virtual)
- [53] *J.A. A'Hearn, M.M. Hedman, C. Mankovich, M. Marley.* Ice Giant Ring Seismology. 2021 meeting of the Division for Planetary Sciences (virtual)
- [52] *M. Dillon, M.M. Hedman.* Evidence of a highly inclined dusty ringlet in Saturn's C ring. 2021 meeting of the Division for Planetary Sciences (virtual)
- [51] *J.A. A'Hearn, M.M. Hedman, C. Mankovich, M. Marley.* Ice Giant Ring Seismology. 2021 European Planetary Science Conference (virtual)
- [50] *M.M. Hedman, M. El Moutamid, P. Nicholson, M. Tiscareno.* Recording history in planetary rings with density waves. 2021 meeting of the Division for Dynamical Astronomy (virtual)
- [49] *J.A. A'Hearn, M.M. Hedman, C. Mankovich, M. Marley.* Ice Giant Ring Seismology. 2021 meeting of the Division for Dynamical Astronomy (virtual)
- [48] *H. Sharma, M.M. Hedman, S. Vahidinia.* Variations in the Near-Infrared Spectra of Enceladus. 2021 Lunar and Planetary Science Conference (virtual)
- [47] *M.M. Hedman, M. El Moutamid, P.D. Nicholson.* Reading Saturn's recent history in its Rings. 2020 meeting of the Division for Planetary Science (virtual)
- [46] *M.M. Hedman, B. Bridges.* Sudden changes in the structure and orbit of one of Saturn's dusty rings. 2020 meeting of the Division for Dynamical Astronomy (virtual)
- [45] *M. Young, M.M. Hedman.* Evidence for a new type of moonlet wake near Enceladus. 2020 meeting of the Division for Dynamical Astronomy (virtual)
- [44] *J.A. A'Hearn, M.M. Hedman, D.P. Hamilton.* Periodic orbits for small N co-orbital satellite systems. 2020 meeting of Division for Dynamical Astronomy (virtual)
- [43] *M.M. Hedman, R.O. Chancia, G. Provan, S. Cowley, S. Ye.* Using dusty rings to trace asymmetries in Saturn's magnetosphere. 2019 meeting of the American Geophysical Union, San Francisco, CA.
- [42] *H. Sharma, M.M. Hedman, D.H. Wooden, A. Colaprete, A. Cook.* Constraining low-altitude lunar dust from the LADEE/UVS data. 2019 European Planetary Science Conference/Division of Planetary Science, Geneva, Switzerland.



- [41] *J. A'Hearn, M.M. Hedman, D.P. Hamilton.* Are moonlets hidden among the clumps in Saturn's innermost ringlet? 2019 European Planetary Science Conference/Division of Planetary Science, Geneva, Switzerland.
- [40] *M.M. Hedman, P. Helfenstein, R.O. Chancia, E. Roussos, C. Parnicas, A. Verbiscer.* Some of Saturn's Small Satellites have Surprisingly Stygian Surfaces: Evidence for Proton-Induced Darkening in the Saturn System. 2019 European Planetary Science Conference/Division of Planetary Science, Geneva, Switzerland.
- [39] *R. Chancia, M.M. Hedman.* Re-examining the rings of Uranus in the Voyager 2 Images. 2019 meeting of the Division for Dynamical Astronomy, Boulder, CO.
- [38] *J. A'Hearn, M.M. Hedman, D.P. Hamilton.* Are moonlets hidden among the clumps in Saturn's innermost ringlet? 2019 meeting of the Division for Dynamical Astronomy, Boulder CO.
- [37] *M.M. Hedman.* Constraining the Surface Ages of Icy Objects in the Outer Solar System with Cosmogenic Lithium, Beryllium and Boron. 2019 Lunar and Planetary Science Conference, Houston, TX.
- [36] *M.M. Hedman.* What has been happening to Saturn's innermost ringlet. 2018 meeting of the Division for Planetary Science, Knoxville, TN.
- [35] *J. A'Hearn, M.M. Hedman.* Dynamics of multiple bodies in a corotation resonance. 2018 meeting of the Division for Planetary Science, Knoxville, TN.
- [34] *B. Bridges, M.M. Hedman.* An evolving dusty ringlet in Saturn's rings. 2018 meeting of the Division for Planetary Science, Knoxville, TN.
- [33] *R. Chancia, M.M. Hedman.* Post-Cassini update on the D-ring's resonant structures. 2018 meeting of the Division for Planetary Science, Knoxville, TN.
- [32] *J. A'Hearn, M.M. Hedman.* Dynamics of multiple bodies in a corotation resonance. 2018 meeting of the Division for Dynamical Astronomy, San Jose, CA.
- [31] *R. Chancia, M.M. Hedman.* The structure of Jupiter's main ring from New Horizons. 2018 meeting of the Division for Dynamical Astronomy, San Jose, CA.
- [30] *M.M. Hedman, P.D. Nicholson.* Axisymmetric waves in Saturn's rings. 2018 meeting of the Division for Dynamical Astronomy, San Jose, CA.
- [29] *R.O. Chancia, M.M. Hedman, S. Ye, W.S. Kurth.* New patterns in the dust off the edge of Saturn's main rings. 2017 meeting of the Division for Planetary Science, Provo, UT.
- [28] *J. A'Hearn, M.M. Hedman,* Using four-body problems to explore Aegaeon's orbital evolution.. 2017 meeting of the Division for Planetary Science, Provo, UT.
- [27] *M.M. Hedman, J.A. Burns, P.D. Nicholson, M.S. Tiscareno, M.W. Evans, E. Baker.* One last look from the dark side: Cassini's final views of Saturn's rings from the planet's shadow. 2017 meeting of the Division for Planetary Science, Provo, UT.
- [26] *R.O. Chancia, M.M. Hedman, R.G. French.* Weighing Uranus' moon Cressida with the eta ring.. 2017 meeting of the Division for Dynamical Astronomy, London, UK
- [25] *M.M. Hedman, M. el Moutamid, P.D. Nicholson.* Drifting waves in Saturn's C ring, evidence for changes in Saturn's interior. 2017 meeting of the Division for Dynamical Astronomy, London, UK
- [24] *M.M. Hedman, D. Wooden, A. Colaprete, A. Cook.* Possible evidence for low-altitude dust in LADEE-UVS data. 2017 workshop on the Dust, Atmosphere and Plasma environment of the Moon and

small bodies.

[23] *D. Dhingra, M. Hedman, R.N. Clark, F. Postberg.* Spatial variability in Enceladus' plume material across tiger stripes: Observed correlations and implications. 2016 meeting of the American Geophysical Union, San Francisco, CA.

[22] *D. Dhingra, M. Hedman, R.N. Clark.* Spatial variability in Enceladus' plume material: Convergence of evidence or coincidence? 2016 meeting of the Division for Planetary Sciences, Pasadena, CA.

[21] *R.O. Chancia, M.M. Hedman, B. Carter.* Structures in the D ring and Roche Division tied to asymmetries in Saturn's magnetosphere. 2016 meeting of the Division for Planetary Sciences, Pasadena, CA.

[20] *M.M. Hedman, P.D. Nicholson.* Estimating the mass of Saturn's B ring. 2016 meeting of the Division for Planetary Sciences, Pasadena, CA.

[19] *R.O. Chancia, M.M. Hedman.* Persistent pattern speeds in Saturn's D ring. 2016 meeting of the Division for Dynamical Astronomy, Nashville, TN.

[18] *B. Carter, M.M. Hedman.* A dusty ringlet with connections to both Prometheus and the F ring. 2016 meeting of the Division for Dynamical Astronomy, Nashville, TN.

[17] *M.M. Hedman, P.D. Nicholson, M. El Moutamid, S. Graven.* An array of asymmetries in Saturn's structure revealed by its rings. 2016 meeting of the Division for Dynamical Astronomy, Nashville, TN.

[16] *D. Dhingra, M.M. Hedman, R.N. Clark.* Near Infrared spectral systematics of Enceladus' plume: Links to formation conditions and dominant controls; 2016 Lunar and Planetary Science conference, Woddlands, TX.

[15] *M.M. Hedman, P.D. Nicholson.* The mass of Saturn's B ring from hidden density waves; 2015 meeting of the American Geophysical Union, San Francisco, CA

[14] *R.O. Chancia, M.M. Hedman, R.G. French;* A new look back at the structure in Uranus' narrow rings; 2015 meeting of the Division for Planetary Sciences, National Harbor, MD

[13] *D. Dhingra, M.M. Hedman, R.N. Clark;* Structural diversity of the 3-micron absorption band in Enceladus' plume from Cassini VIMS; 2015 meeting of the Division for Planetary Sciences, National Harbor, MD

[12] *M.M. Hedman, M.R. Showalter, J.A. Burns.* Corrugations and Spirals: Recent Disturbances in Saturn's D ring. 2015 European Planetary Science Congress Meeting, Nantes, France

[11] *M.M. Hedman,* What happened to Saturn in December of 2011? 2015 meeting on the Magnetospheres of the Outer Planets, Atlanta, GA

[10] *M.M. Hedman;* Wavelet analyses of Saturn's rings: Extracting masses and motions from wavelet phases; 2015 meeting of the Northwest Section of the American Physical Society, Pullman, WA (Invited)

[9] *D. Dhingra, M.M. Hedman, R.N. Clark, P.D. Nicholson;* Spectral characterization of spatially resolved water ice plumes on Enceladus using Cassini VIMS data; 2015 Lunar and Planetary Sciences Congress, Houston, TX

[8] *M.M. Hedman;* The Cassini spacecraft reveals Saturn's rings; 2014 Meeting of the Pacific Northwest Association for College Physics, Bellingham, WA

[7] *M.M. Hedman, P.D. Nicholson;* How massive is Saturn's B ring? Clues from cryptic density waves; 2015 meeting of the Division for Dynamical Astronomy, Pasadena, CA

[6] **M.M. Hedman**, J.A. Burns, M. Showalter; A New pattern in Saturn's D ring; 2014 fall meeting of the American Geophysical Union, San Francisco, CA

[5] **M.M. Hedman**; What's going on around the outer planets? A report of recent ring research; 2014 meeting of the Division for Planetary Science, Tucson, AZ (Invited)

[4] **M.M. Hedman**, R.G. Franch, C. McGhee-French; What can Uranus' rings tell us about Uranus' internal structure? 2014 Workshop on the study of the Ice Giant planets, Laurel, MD

[3] **M.M. Hedman**, P.D. Nicholson; An unusual density wave in Saturn's C ring, evidence for a supersonic resonance? 2014 meeting of the Division for Dynamical Astronomy, Philadelphia, PA

[2] **M.M. Hedman**, J.A. Burns, C.C. Porco; The dark side of Saturn's rings: Comparing eclipse observations from Cassini; 2013 meeting of the American Geophysical Union, San Francisco, CA

[1] **M.M. Hedman**, P.D. Nicholson; Kronoseismology: Determining Saturn's acoustic normal mode frequencies using density waves in the rings; 2013 meeting of the Division for Planetary Science, Denver, CO

---Presented prior to arriving at U. Idaho (26)

[26] **M.M. Hedman**, J.A. Burns, P.D. Nicholson, M.R. Showalter, M.S. Tiscareno; Delving into D-ring dynamics: Probes of Saturn's interior and clues to its recent history; 2013 meeting of the Division for Dynamical Astronomy, Paraty, Brazil

[25] **M.M. Hedman**, J.A. Burns, M.R. Showalter, D.P. Hamilton; Dust dynamics in the Encke gap: Hill's equations and ion interactions; 2012 meeting of the American Geophysical Union, San Francisco, CA

[24] **M.M. Hedman**, C. Gosmeyer, P.D. Nicholson; Monitoring Enceladus' activity with Cassini-VIMS; 2012 meeting of the American Geophysical Union, San Francisco, CA

[23] **M.M. Hedman**, P.D. Nicholson, H. Salo; Probing periodic patterns in Saturn's inner A ring with Cassini-VIMS; 2012 meeting of the Division for Planetary Sciences, Reno, NV

[22] **M.M. Hedman**, Dynamics of dusty rings; 2012 meeting of the Division for Dynamical Astronomy; Mount Hood, OR

[21] **M.M. Hedman**, P.D. Nicholson, G. Filacchione, F. Capaccioni, M. Ciarniello, R.N. Clark, J.N. Cuzzi, Cassini VIMS Team; Correlations between spectra and structures in Saturn's rings; 2011 meeting of the American Geophysical Union, Pasadena, CA and 2011 European Planetary Science Conference, Nantes, France

[20] **M.M. Hedman**, J.A. Burns, P.C. Thomas, M.S. Tiscareno, M.W. Evans. Physical properties of the small moon Aegaeon (Saturn LIII); 2011 European Planetary Science Conference, Nantes, France

[19] **M.M. Hedman**, J.A. Burns, M.S. Tiscareno; Of horseshoes and heliotropes: The dynamics of dust in the Encke Gap; 2011 meeting of the Division for Dynamical Astronomy, Austin, TX

[18] **M.M. Hedman**, P.D. Nicholson, M.R. Showalter, Cassini VIMS Team; Spectroscopic identification of clumps in the F ring; 2010 meeting of the Division for Planetary Science, Pasadena, CA

[17] **M.M. Hedman**, J.A. Burns, M.S. Tiscareno, C.C. Porco; A corrugated curiosity in Saturn's C ring; 2010 meeting of the Division for Dynamical Astronomy, Boston, MA

[16] **M.M. Hedman**, P.D. Nicholson; A resonance-based model for the architecture of the Cassini Division; 2009 meeting of the American Geophysical Union, San Francisco, CA

[15] **M.M. Hedman**, J.A. Burns, M.S. Tiscareno, C.C. Porco; Curious corrugations in the C ring; 2009

meeting of the Division of Planetary Science; Fajardo, PR

[14] **M.M. Hedman**, P.D. Nicholson, VIMS Team; The architecture of the Cassini Division I; 2009 meeting of the Division for Dynamical Astronomy, Virginia Beach, VA

[13] **M.M. Hedman**, P.D. Nicholson, M.R. Showalter; Cassini-VIMS observations of particles in Enceladus' plume and the E ring; 2008 European Planetary Science Conference, Munster, Germany

[12] **M.M. Hedman**, C.D. Murray, N.J. Cooper, M.S. Tiscareno, K. Beurle, M.W. Evans, J.A. Burns; A trio of tiny moons with tenuous rings; 2008 meeting of the Division of Planetary Science, Ithaca, NY

[11] **M.M. Hedman**, J.A. Burns, M.S. Tiscareno, P.D. Nicholson, C.C. Porco; Cassini observations of Lindblad resonances in low optical depth rings; 2008 meeting of the Division for Dynamical Astronomy, Boulder, CO

[10] **M.M. Hedman**, J.A. Burns, M.S. Tiscareno, P.D. Nicholson, C.C. Porco; Possible resonances with Saturn's rotation in the rings; 2007 meeting of the American Geophysical Union, San Francisco, CA

[9] **M.M. Hedman**, J.A. Burns, M.S. Tiscareno, C.C. Porco; The heliotropic rings of Saturn; 2007 meeting of the Division for Planetary Sciences, Orlando, FL

[8] **M.M. Hedman**, J.A. Burns, M.S. Tiscareno, C.C. Porco; Structures in Saturn's G ring; 2007 of the Division for Dynamical Astronomy, Ann Arbor, MI

[7] **M.M. Hedman**, J.A. Burns, M.S. Tiscareno, P.D. Nicholson, C.C. Porco, G.H. Jones, E. Roussos, N. Krupp, C. Paranicas; Multi-Instrument studies of an arc in Saturn's G ring; 2006 meeting of the American Geophysical Union, San Francisco, CA

[6] **M.M. Hedman**, J.A. Burns, M.S. Tiscareno, P.D. Nicholson, C.C. Porco, G. Jones, E. Roussos, N. Krupp; An arc in Saturn's G ring; 2006 meeting of the Division for Planetary Science, Pasadena, CA

[5] **M.M. Hedman**, P.D. Nicholson, B.D. Wallis; Cassini-VIMS observations of stellar occultations by Saturn's rings; 2005 meeting of the American Geophysical Union, San Francisco, CA

[4] **M.M. Hedman**, J.A. Burns, M.S. Tiscareno, P.D. Nicholson, M.R. Showalter, J.N. Cuzzi, C.C. Porco, Cassini Imaging Team; Cassini's discoveries in the D and G rings; 2005 meeting of the Division for Planetary Science, Cambridge, UK

[3] **M.M. Hedman**, J.A. Burns, C.D. Murray, M.S. Tiscareno, J.N. Cuzzi, C.C. Porco, H. Dones, A. Brahic, C. Ferrari; Faint rings and things according to Cassini; 2004 Division for Planetary Science, Louisville, KY

[2] **M.M. Hedman**, D. Barkats, J.O. Gundersen, S.T. Staggs; Results from the first observing season of PIQUE; 2000 meeting of the American Astronomical Society, San Jose, CA

[1] **M.M. Hedman**; PIQUE, A status Report; 2000 Kavli Institute for Theoretical Physics meeting, Santa Barbara, CA

**SERVICE:****Major Committee Assignments:**

U. Idaho Physics Dept. Graduate Admissions Committee 2013-Present  
 U. Idaho Physics Dept. Academic Standards Committee 2015-Present  
 U. Idaho Physics Dept. Website Committee 2016-2021  
 U. Idaho Library Affairs Committee 2016-2019, 2023-Present

**Professional and Scholarly Organizations**

(including memberships, committee assignments, editorial services, offices held and dates)

Member of Panel on Giant Planet Systems for the Planetary Science  
 and Astrobiology Decadal Survey 2023-2032

Member of American Geophysical Union  
 Member of American Astronomical Society  
 Committee Member of the Division for Dynamical Astronomy 2011-2013  
 Secretary for Division for Dynamical Astronomy 2022-Present

Organized Rings 2011 Scientific Workshop  
 Served on VOC for 2020 Virtual Division of Planetary Sciences Meeting

Reviewed articles for Journals  
*Icarus* (27 reviews, 22 since arriving at U. Idaho)  
*The Astrophysical Journal* (3 since arriving at U. Idaho)  
*Monthly Notices of the Royal Astronomical Society* (3 since arriving at U. Idaho)  
*Geophysics Research Letters* (1 since arriving at U. Idaho)  
*Planetary Science Journal* (3 since arriving at U. Idaho)  
*Nature* (1 since arriving at U. Idaho)

Panelist for JWST Telescope Allocation Committee (2024)  
 External Reviewer for NASA Research Analysis Programs (2011-2022)  
 Panelist for NASA Programs (2007,2010,2016, 2017)  
 External Reviewer for NSF Office of Polar Programs (2009, 2011, 2012)

**Outreach Service:** (Including popular press, interview articles, newspaper articles, workshops-seminars-tours organized, Extension impact statements)

Presentation on Europa Clipper at Spacepoint 2023 Summer Solstice Sci-Fest in Sandpoint.

Presentations on JWST's capabilities as part of 2023 NESSP

"Amateur finds new images of Uranus' rings in 35-year-old data" Sky and Telescope 10.22.2022

"What Cassini continues to reveal about Saturn" Planetary Society New Story 9.13.2022

University of Idaho Telescope Grand Opening Celebration and Star Party. 9.9.2022

"Are Water Plumes Spraying from Europa?" JPL News Story 11.30.2021.

"How Old are Saturn's Rings?" Boise State Public Radio 2.7.2020.

"Are Saturn's rings really as young as the dinosaurs?" Quanta Magazine 11.21.2019

“How long is a day on Saturn?” National Geographic 1.23.2019

“Cassini at Saturn: A retrospective” Scientific American 9.12.2017

“Cassini the Saturn spacecraft’s fond farewell” Newsday 9.5.2017

“Some of Uranus’ small moons are doomed to collide” New Scientist. 9.4.2017

“Casting Shadows” Pacific Northwest Inlander, 8.17.2017

“What Cassini can teach us” Here we have Idaho, Spring 2017

“Uranus moons discovery: Two new ‘moonlets’ found orbiting planet” The independent 11.17.2016

“Demystifying the final frontier—Data suggests there may be a moon orbiting Uranus” UI Argonaut y 11.16.2016

“Wavy rings point to two undiscovered moons at Uranus” Cosmos 10.23.2016

“Uranus might have two dark moons we’ve never seen before” New Scientist 10.14.2016

“Rings, moons and the age of the universe – UI researcher measures mass of Saturn’s brightest ring.” UI Argonaut 02.16.2016

“Saturn’s ring mystery: Why are opacity and density mismatched?” Christian Science Monitor 2/5/2016

“Saturn’s rings: Less than meets the eye?” Astronomy Magazine 2.3.2016

“Something strange is happening inside Saturn” space.com 11.29.2015

“Cassini spies mysterious object named ‘Peggy’ at edge of Saturn’s rings” Wired, 12.10.2013

“NASA Image of Saturn shows and Idaho professor’s work” Boise State Public Radio 11.18.2013

“Saturn, Earth shine in amazing new photo by NASA Probe” Space.com 11.12.2013