

Matthew Steven Tiscareno

Senior Research Scientist

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Education

2004 Ph.D., Planetary Science, University of Arizona

1998 B.S., Planetary Science, California Institute of Technology

Research Experience

SETI Institute, Mountain View, California

2015 – Senior Research Scientist

Cornell University, Ithaca, New York

2011 – 2015 Senior Research Associate

2004 – 2011 Research Associate, advisor: Joseph A. Burns

University of Arizona, Tucson, Arizona

1999 – 2004 Graduate Research Assistant, advisor: Renu Malhotra (previously Paul Geissler, Carolyn Porco)

California Institute of Technology, Pasadena, California

1996 – 1999 Undergraduate Research Assistant, advisor: Michael E. Brown (previously G. Edward Danielson)

Current Research Interests

Orbital and rotational dynamics of satellites and planets

Disk-moon dynamical interactions

Planetary rings

Orbital histories of Kuiper Belt and Trans-Neptunian Objects

Remote sensing for space projects

Missions to the outer solar system

Team Memberships and Associations

Cassini Project, Participating Scientist, 2013 to present

Cassini Project, Imaging Team Associate, 2004 to present

Planetary Data System (PDS) Ring-Moon Systems Node, Team Member, 2015 to present

James Webb Space Telescope (JWST) Guaranteed Time Observations, Team Member, 2016 to present

James Webb Space Telescope (JWST) Early Release Science Observations, Team Member, 2017 to present

Uranus Pathfinder Mission Concept Proposal (2010, '13, '15, '16), Team Member and Rings Science Lead

Saturn Ring Skimmer Mission Concept Proposal (2017), Team Member

Service to the Science Community

Director, SETI Institute Research Experience for Undergraduates (REU) program, 2017 to present

Member, DPS Subcommittee on Professional Culture and Climate, 2016 to present

Local Organizing Committee co-chair, 2018 DDA Meeting, San Jose CA

Lead Editor, *Planetary Ring Systems: Properties, Structure, and Evolution*, 650-page scholarly edited volume published by Cambridge University Press in 2018

Member, NASA Planetary Data System (PDS) Roadmap Study Team, 2016 to 2017

Division Committee member, AAS Division on Dynamical Astronomy (DDA), 2014 to 2016

Leader, Planetary Rings Focus Group, James Webb Space Telescope Planetary Science Working Group, 2014 to 2015

Associate Editor, *Earth Moon and Planets*, September 2011 to December 2015

Science Organizing Committee member, 2017 DDA Meeting, London, England

Science Organizing Committee member, 2016 DDA Meeting, Nashville TN

Science Organizing Committee member, 2014 DPS Meeting, Tucson AZ

Science Organizing Committee member, “Uranus since Voyager 2” Meeting, Meudon, France, September 2013

Rings Facilitator, Uranus Working Group, NASA Outer Planets Assessment Group (OPAG), October 2011

Science Program Committee member, 2011 DPS Meeting, Nantes, France

Science/Local Organizing Committee member, Rings2011 Meeting, Ithaca NY

Science advisor to Team X technology study for future Saturn Ring Observer mission, Mar 2010 to May 2010, commissioned by the NRC Planetary Science Decadal Survey.
 Local Organizing Committee member, 2008 DPS Meeting, Ithaca NY
 Grant Proposal Review Panels: NASA (2008, 2010, 2012, 2014, 2018), NSF (2008)
 Grant Proposal External Reviews: NASA (2007–2017), German Research Foundation (2013)
 Instrument Proposal External Reviews: NASA (2012)
 NASA Postdoctoral Program External Reviews (2009–2010, 2012)
 Manuscript Reviews: *Science*, *Nature*, *Science Advances*, *Nature Astronomy*, *Icarus*, *Astronomical Journal*, *Astrophysical Journal*, *Astronomy & Astrophysics*, *Geophysical Research Letters*, *Planetary and Space Science*, *Earth Moon and Planets*, Springer books, Cambridge University Press books
 Book Proposal Reviews: Cambridge University Press, CRC Press

Community White Papers

McNutt R, Gaddis L, Law E, Beyer R, Crombie K, Ebel D, Ghosh A, Grayzeck E, Morgan T, Paganelli F, Powell K, Raugh A, Stein T, **Tiscareno M**, Weber R 2017. *Planetary Data System Roadmap Study for 2017–2026*, NASA.
Tiscareno MS and Showalter MR 2017. Observing outer planet systems in the mid-21st century. *Vision 2050 Workshop Abstracts (LPI Contribution No. 1989)*, 8205.
 Diniega S, Tan J, **Tiscareno MS**, and Wehner E 2016. Senior community members must engage in the fight against harassment. *Eos* **64** (4), 255–257.
Tiscareno MS, Showalter MR, French RG, Burns JA, Cuzzi JN, de Pater I, Hamilton DP, Hedman MM, Nicholson PD, Tamayo D, Verbiscer AJ, Milam SN, and Stansberry JA 2016. Observing planetary rings with the James Webb Space Telescope: Science justifications and observation requirements. *Publications of the Astronomical Society of the Pacific* **128**, 018008 (arXiv:1403.6849).
 Norwood J, Hammel H, Milam S, Stansberry J, Lunine J, Chanover N, Hines D, Sonneborn G, **Tiscareno MS**, Brown M, and Ferruit P 2016. Solar system observations with the James Webb Space Telescope. *Publications of the Astronomical Society of the Pacific* **128**, 025004 (arXiv:1403.6845).
Tiscareno MS and 49 colleagues 2009. Rings research in the next decade. White paper submitted to the NRC Planetary Science Decadal Survey (Page 6 at <http://www8.nationalacademies.org/ssbsurvey/publicview.aspx>).

Refereed Reviews and Book Chapters

Citations	Reference	Source: Google Scholar
–	Tiscareno MS and Hedman MM 2018. A review of Morlet wavelet analysis of radial profiles of Saturn’s rings. <i>Phil. Trans. A</i> , in press.	
–	Thomas PC, Tiscareno MS , and Helfenstein P 2018. The inner small satellites of Saturn, and Hyperion. In Schenk PM, Clark RN, Howett, CJA, Verbiscer AJ, and Waite JH, eds. <i>Enceladus and the Icy Moons of Saturn</i> (University of Arizona Press), in press.	
–	Spahn F, Hoffmann H, Rein H, Sremcevic M, Tiscareno MS , and Seiss M 2018. Embedded moonlets in dense rings. In Tiscareno MS and Murray CD, eds. <i>Planetary Ring Systems</i> (Cambridge University Press), 157–197.	
–	Tiscareno MS and Murray CD 2018. The future of planetary ring studies. In Tiscareno MS and Murray CD, eds. <i>Planetary Ring Systems</i> (Cambridge University Press), 577–579.	
14	Tiscareno MS 2013. Planetary rings. In Oswald TD, French L, and Kalas P, eds. <i>Planets, Stars, and Stellar Systems. Volume 3: Solar and Stellar Planetary Systems</i> (Springer), 309–370 (arXiv:1112.3305).	
82	Cuzzi JN and 22 colleagues (including Tiscareno MS) 2010. An evolving view of Saturn’s dynamic rings. <i>Science</i> 327 , 1470–1475.	
75	Colwell JE, Nicholson PD, Tiscareno MS , Murray CD, French RG, and Marouf EA 2009. The structure of Saturn’s rings. In Dougherty M, Esposito L, and Krimigis T, eds. <i>Saturn from Cassini-Huygens</i> (Springer).	

Refereed Journal Articles

Citations	Reference	Source: Google Scholar
–	Tiscareno MS and 20 colleagues 2018. Close-range remote sensing of Saturn’s rings during Cassini’s ring grazing orbits and grand finale. <i>Science</i> , submitted.	
1	Tiscareno MS and Harris BE 2018. Mapping radial structure in Saturn’s rings. <i>Icarus</i> 312 , 157–171 (arXiv:1708.03702).	
3	Tajeddine R, Nicholson PD, Tiscareno MS , Hedman MM, Burns JA, and El Moutamid M 2017. Dynamical phenomena at the inner edge of the Keeler Gap. <i>Icarus</i> 289 , 80–93.	
9	El Moutamid M, Nicholson PD, French RG, Tiscareno MS , Murray CD, Evans MW, McGhee French C, Hedman MM, and Burns JA 2016. How Janus’ orbital swap affects the edge of Saturn’s A ring. <i>Icarus</i> 279 , 125–140 (arXiv:1510.00434).	
–	Schmidt J, Colwell JE, Lehmann M, Marouf EA, Salo H, Spahn F, and Tiscareno MS 2016. On the linear damping relation for density waves in Saturn’s rings. <i>Astrophys. J.</i> 824 , 33.	
100	Thomas PC, Tajeddine R, Tiscareno MS , Burns JA, Joseph J, Loredo TJ, Helfenstein P, and Porco C 2016. Enceladus’s measured physical libration requires a global subsurface ocean. <i>Icarus</i> 264 , 37 (arXiv:1509.07555).	
3	Leh�bel A and Tiscareno MS 2015. Stability of rings about a triaxial primary. <i>Astron. Astrophys.</i> 576 , A92 (arXiv:1504.07807).	
5	Hong YC, Tiscareno MS , Nicholson PD, and Lunine JI 2015. Orbital instability of close-in exomoons in non-coplanar systems. <i>Mon. Not. Roy. Astron. Soc.</i> 449 , 828–834 (arXiv:1502.04747).	
23	Mouis O and 50 colleagues (including Tiscareno MS) 2014. Scientific rationale of Saturn’s <i>in situ</i> exploration. <i>Planet. Space Sci.</i> 104 , 29–47 (arXiv:1404.4811).	
14	Arridge CS and 113 colleagues (including Tiscareno MS) 2014. The science case for an orbital mission to Uranus: Exploring the origins and evolution of ice giant planets. <i>Planet. Space Sci.</i> 104 , 122–140.	
11	Thomas PC, Burns JA, Hedman MM, Helfenstein P, Morrison S, Tiscareno MS , and Veverka J 2013. The inner small satellites of Saturn: A variety of worlds. <i>Icarus</i> 226 , 999–1019.	
6	Tiscareno MS , Hedman MM, Burns JA, Weiss JW, and Porco CC 2013. Probing the inner boundaries of Saturn’s A ring with the Iapetus –1:0 nodal bending wave. <i>Icarus</i> 224 , 201–208 (arXiv:1302.5712).	
22	Tiscareno MS , Mitchell CJ, Murray CD, Di Nino D, Hedman MM, Schmidt J, Burns JA, Porco CC, Beurle K, and Evans MW 2013. Observations of ejecta clouds produced by impacts onto Saturn’s rings. <i>Science</i> 340 , 460–464.	
7	Tiscareno MS 2013. A modified “Type I migration” model for propeller moons in Saturn’s rings. <i>Planet. Space Sci.</i> 77 , 136–142 (arXiv:1206.4942).	
17	Tiscareno MS , Hedman MM, Burns JA, and Castillo-Rogez J 2013. Compositions and origins of outer planet systems: Insights from the Roche critical density. <i>Astron. J.</i> 765 , L28 (arXiv:1302.1253).	
39	Arridge CS, Agnor CB, Andre N, Baines KH, Fletcher LN, Gautier D, Hofstadter MD, Jones GH, Lamy L, Lanvegin Y, Mouis O, Nettelmann N, Russell CT, Stallard T, Tiscareno MS , Tobie G, and 63 additional colleagues 2012. Uranus Pathfinder: Exploring the origins and evolution of Ice Giant planets. <i>Exp. Astron.</i> 33 , 753–791.	
28	Hedman MM, Burns JA, Evans MW, Tiscareno MS , and Porco CC 2011. Saturn’s curiously corrugated C ring. <i>Science</i> 332 , 708–711.	
23	Hedman MM, Burt JA, Burns JA, and Tiscareno MS 2010. The shape and dynamics of a heliotropic dusty ringlet in the Cassini Division. <i>Icarus</i> 210 , 284–297 (arXiv:1006.2703).	
53	Tiscareno MS , Burns JA, Sremcevic M, Beurle K, Hedman MM, Cooper NJ, Milano AJ, Evans MW, Porco CC, Spitale JN, and Weiss JW 2010. Physical characteristics and non-keplerian orbital motion of “propeller” moons embedded in Saturn’s rings. <i>Astrophys. J. Lett.</i> 718 , L92–L96 (arXiv:1007.1008).	
20	Tiscareno MS , Burns JA, Cuzzi JN, and Hedman MM 2010. Cassini imaging search rules out rings around Rhea. <i>Geophys. Res. Lett.</i> 37 , L14205 (arXiv:1008.1764).	
–	Spilker TR, Borden CS, Smythe W, Cole B, Petropoulos A, Dankanich J, Kamhawi H, Schmitz P, Mason L, Elliott J, Strange N, Moeller R, Nicholson P, Tiscareno M , Spilker L, Dudzinski L, Reh K, and Benson S 2010. Saturn Ring Observer concept and architecture options. <i>Journal of the British Interplanetary Society</i> 63 , 345–350.	

- 24 Hedman MM, Cooper NJ, Murray CD, Beurle K, Evans MW, **Tiscareno MS**, and Burns JA 2010. Aegaeon (Saturn LIII), a G ring object. *Icarus* **207**, 433–447 (arXiv:0911.0171).
- 18 **Tiscareno MS**, Perrine RP, Richardson DC, Hedman MM, Weiss JW, Porco CC, and Burns JA 2010. An analytic parameterization of self-gravity wakes in Saturn’s rings, with application to occultations and propellers. *Astron. J.* **139**, 492–503 (arXiv:0911.3161).
- 17 Morrison SJ, Thomas PC, **Tiscareno MS**, Burns JA, and Veverka J 2009. Grooves on small saturnian satellites and other objects: Characteristics and significance. *Icarus* **204**, 262–270.
- 36 **Tiscareno MS**, Thomas PC, and Burns JA 2009. The rotation of Janus and Epimetheus. *Icarus* **204**, 254–261 (arXiv:0904.3515).
- 27 **Tiscareno MS** and Malhotra R 2009. Chaotic diffusion of resonant Kuiper Belt objects. *Astron. J.* **138**, 827–837 (arXiv:0807.2835).
- 13 Hedman MM, Burns JA, **Tiscareno MS**, and Porco CC 2009. Organizing some very tenuous things: Resonant structures in Saturn’s faint rings. *Icarus* **202**, 260–279.
- 29 Weiss JW, Porco CC, and **Tiscareno MS** 2009. Ring edge waves and the masses of nearby satellites. *Astron. J.* **138**, 272–286.
- 41 Hedman MM, Murray CD, Cooper NJ, **Tiscareno MS**, Beurle K, Evans MW, and Burns JA 2009. Three tenuous rings/arcs for three tiny moons. *Icarus* **199**, 378–386.
- 70 **Tiscareno MS**, Burns JA, Hedman MM, and Porco CC 2008. The population of propellers in Saturn’s A Ring. *Astron. J.* **135**, 1083–1091 (arXiv:0710.4547).
- 45 Hedman MM, Burns JA, **Tiscareno MS**, Porco CC, Jones GH, Roussos E, Krupp N, Paranicas C, and Kempf S 2007. The source of Saturn’s G Ring. *Science* **317**, 653–656.
- 85 **Tiscareno MS**, Burns JA, Nicholson PD, Hedman MM, and Porco CC 2007. Cassini imaging of Saturn’s rings II: A wavelet technique for analysis of density waves and other radial structure in the rings. *Icarus* **189**, 14–34 (astro-ph/0610242).
- 48 Hedman MM, Burns JA, Showalter MR, Porco CC, Nicholson PD, Bosh AS, **Tiscareno MS**, Brown RH, Buratti BJ, Baines KH, and Clark R 2007. Saturn’s dynamic D Ring. *Icarus* **188**, 89–107.
- 29 **Tiscareno MS**, Nicholson PD, Burns JA, Hedman MM, and Porco CC 2006. Unravelling temporal variability in Saturn’s spiral density waves: Results and predictions. *Astrophys. J. Lett.* **651**, L65–L68 (astro-ph/0609242).
- 96 **Tiscareno MS**, Burns JA, Hedman MM, Porco CC, Weiss JW, L. Dones, Richardson DC, and Murray CD 2006. 100-meter-diameter moonlets in Saturn’s A Ring from observations of ‘propeller’ structures. *Nature* **440**, 648–650.
- 353 Porco CC and 35 colleagues (including **Tiscareno MS**) 2005. Imaging of Titan from the Cassini spacecraft. *Nature* **434**, 159–168.
- 158 Porco CC and 34 colleagues (including **Tiscareno MS**) 2005. Cassini imaging science: Initial results on Phoebe and Iapetus. *Science* **307**, 1237–1242.
- 302 Porco CC and 34 colleagues (including **Tiscareno MS**) 2005. Cassini imaging science: Initial results on Saturn’s rings and small satellites. *Science* **307**, 1226–1236.
- 77 Porco CC and 34 colleagues (including **Tiscareno MS**) 2005. Cassini imaging science: Initial results on Saturn’s atmosphere. *Science* **307**, 1243–1247.
- 101 **Tiscareno MS** and Malhotra R 2003. The dynamics of known Centaurs. *Astron. J.* **126**, 3122–3131 (astro-ph/0211076).
- 354 Porco CC and 23 colleagues (including **Tiscareno MS**) 2003. Cassini imaging of Jupiter’s atmosphere, satellites, and rings. *Science* **299**, 1541–1547.
- 15 **Tiscareno MS** and Geissler PE 2003. Can redistribution of material by sputtering explain the hemispheric dichotomy of Europa? *Icarus* **161**, 90–101.
- Total number of citations: First-author papers: 602 All papers: 2478
Citations per pre-2017 item: First-author papers: 40.1 All papers: 63.4
h-index (see Wikipedia article): First-author papers: 14 All papers: 23

Popular Articles

- Tiscareno MS** 2018. Rings as a physics demonstration. *Explorer*, May 2018 issue, 8–10.
- Tiscareno MS** 2017. Cassini and the rings of Saturn. *American Scientist* **105** (6), 356–361.
- Lindbergh B, Simon A, Del Genio T, Guerlet S, Bjoraker G, Li L, Orton GS, Shemansky DE, Colwell J, Dones L, Murray C, **Tiscareno M**, Nixon CA, Barnes J, Coustenis A, Soderblom L, Radebaugh J, Elachi C, Wall SD, Lunine J, Hofgartner J, Lopes R, Cable M, Bittner M, Thomsen M, Barber TJ, Hansen C, Buratti B, and Ray T 2017. “Something special is happening”: Cassini’s scientists honor their favorite photos. *The Ringer* (<https://www.theringer.com/tech/2017/9/14/16305632/nasa-cassini-mission-scientists-pick-their-favorite-photos>)
- Tiscareno MS** 2017. Carl Sagan. In *Dictionary of Christianity and Science* (Zondervan), 584.
- Tiscareno MS** 2017. Merton Thesis. In *Dictionary of Christianity and Science* (Zondervan), 436.
- Gauch HG Jr. and **Tiscareno MS** 2017. Science. In *Dictionary of Christianity and Science* (Zondervan), 588–590.
- Tiscareno MS** 2015. Ask Astro: Can a moon have its own moon? *Astronomy* (September 2015).
- Tiscareno MS** 2014. James Webb Space Telescope’s astounding view of the solar system. *SPIE Newsroom* (11 April 2014), doi:10.1117/2.1201404.005406.
- Tiscareno MS** and Hedman MM 2013. Planetary rings. In Spohn T, Johnson TV, and Breuer D, eds. *Encyclopedia of the Solar System, 3rd edition* (Elsevier), 883–905.
- Tiscareno MS** and Hedman MM 2009. News and views: Saturn’s colossal ring. *Nature* **461**, 1064–1065.
- Tiscareno MS** 2007. Ringworld Revelations. *Sky & Telescope* **113** (2), 32–39.

Academic Work

- Tiscareno MS** 2004. Chaotic diffusion in the outer solar system, and other topics. Ph.D. thesis, Univ. of Arizona.

Invited Lectures at Academic Meetings and Institutions

- “Imaging of Saturn’s main rings during the Cassini ring-grazing orbits and grand finale”
24 September 2018: University of Idaho, Department Colloquium
- “Imaging of Saturn’s main rings during the Cassini ring-grazing orbits and grand finale”
20 September 2018: University of California Berkeley, Department Colloquium
- “Imaging of Saturn’s main rings during the Cassini ring-grazing orbits and grand finale”
22 February 2018: University of California Los Angeles, Department Colloquium
- “High-resolution imaging of Saturn’s main rings during the Cassini ring-grazing orbits and grand finale”
12 December 2017: Fall AGU Meeting, U22A-06
- “High-resolution imaging of Saturn’s main rings during the Cassini ring-grazing orbits and grand finale”
16 October 2017: DPS Meeting **49**, 108.02
- “Cassini: A look back and a fond farewell”
28 September 2017: SETI Institute, Institute Lecture Series
- “Imaging of Saturn’s main rings during the Cassini ring-grazing orbits and grand finale”
22 September 2017: EPSC Meeting **11**, 996
- “Rings science highlights from the Cassini ring-grazing orbits and grand finale”
14 June 2017: DDA Meeting **48**, 401.02
- “Imaging of Saturn’s main rings during the Cassini ring-grazing orbits and grand finale”
24 May 2017: SETI Institute, Department Colloquium
- “Peregrinations of propellers in Saturn’s rings”
18 May 2016: SETI Institute, Department Colloquium
- “Rotational and interior models for Enceladus”
17 February 2016: University of California Berkeley, Department Colloquium
- “Dynamics of Saturn’s rings and moons”
22 January 2016: University of California Santa Cruz, Department Colloquium
- “Saturn’s rings: A nearby astrophysical disk”
31 March 2015: SETI Institute, Institute Lecture Series
- “Saturn’s rings: A nearby astrophysical disk”
15 September 2014: University of Rochester, Department Colloquium
- “Cassini at Saturn: Science today and in the final three years: Saturn’s rings”
15 December 2014: Fall AGU Meeting, P12A-03 (in place of J.N. Cuzzi)
- “Observing planetary rings with the James Webb Space Telescope”
9 November 2014: DPS Meeting, JWST Workshop
- “Observing the solar system with the James Webb Space Telescope”
8 January 2014: Winter AAS Meeting **223**, 314.02
- “Observations of ejecta clouds produced by impacts onto Saturn’s rings”

10 December 2013: Fall AGU Meeting, P21E-02
 “Dynamical insights into the history and composition of Uranus’ rings and small moons”
 17 September 2013: “Uranus beyond Voyager 2” Meeting (Meudon, France)
 “What can planetary rings teach us about planetary systems?”
 12 March 2012: Georgia Institute of Technology, Department Colloquium
 “The Uranian ring system”
 17 October 2011: NASA OPAG Uranus Working Group, Pasadena CA
 “Dynamics of planetary rings”
 13 April 2011: DDA Meeting **42**, 8.01
 “The rotation of Janus and Epimetheus”
 8 April 2011: European Geophysical Union Meeting (Vienna, Austria), PS6.1-4336
 “The changing orbits of ‘propeller’ moons in Saturn’s rings”
 6 April 2011: European Geophysical Union Meeting (Vienna, Austria), PS3.1-1600
 “The changing orbits of ‘propeller’ moons in Saturn’s rings”
 15 December 2010: Fall AGU Meeting, P33D-01
 “Saturn’s rings: A nearby astrophysical disk”
 31 January 2011: University of Idaho, Department Colloquium
 “Saturn’s rings: A nearby astrophysical disk”
 5 November 2010: Wells College, Department Colloquium
 “Orbital dynamics of trans-Neptunian objects”
 28 June 2010: TNO 2010 Meeting, Philadelphia PA
 “Saturn’s rings: Up close and personal with an astrophysical disk”
 10 May 2010: Peking University (Beijing, China), KIAA Dynamics of Astrophysical Disks Workshop
 “Saturn’s rings: Direct observations of disk-embedded masses”
 1 February 2010: University of Colorado, Department Colloquium
 “Saturn’s rings: Direct observations of disk-embedded masses”
 17 September 2009: Cornell University, Department Colloquium
 “Saturn’s rings: An accessible astrophysical disk”
 10 January 2008: AAS Meeting **211**, 109.06 (Special Session: “The Dynamics of Astrophysical Disks”)
 “Knots and ripples in the fabric of Saturn’s rings”
 5 December 2007: University of Maryland, Department Colloquium
 “Ring reconnaissance with weak waves”
 13 December 2006: Fall AGU Meeting, Session P34A-02

Contributed Abstracts and Presentations at Scientific Meetings

Only presentations given in person are listed below. An additional 71 co-author presentations are not listed. Invited talks at conferences are listed above, and not listed again below.

Chiar J, Phillips CB, Rudolph A, Bonaccorsi R, and Tarter J 2016. Life in the Universe: Astronomy and planetary science Research Experience for Undergraduates at the SETI Institute. *Fall AGU*, ED51B-0799
Tiscareno MS 2016. Observing planetary rings and small moons with JWST. *Exploring the Universe with JWST II Conference* (Montreal QC, Canada)
Tiscareno MS 2016. Propeller peregrinations: Ongoing observations of disk-embedded migration in Saturn’s rings. *DPS 48*, 114.01
Tiscareno MS 2016. Orbits and rotation states of Enceladus and other moons of Saturn. *Enceladus and the Icy Moons of Saturn Conference* (Boulder CO)
Tiscareno MS 2016. Dynamical context of Phobos and Deimos: Rotation states, orbits and rings. *Phobos Deimos Conference* (Moffett Field CA)
Tiscareno MS 2016. Propeller peregrinations: Ongoing observations of disk-embedded migration in Saturn’s rings. *DDA 47*, 400.01
Tiscareno MS and Harris BE 2015. Mapping spiral waves and other radial features in Saturn’s rings. *Fall AGU*, P43E-05
Tiscareno MS and Arnault EG 2015. Wisps in the outer edge of the Keeler Gap. *DPS 47*, 104.05
Tiscareno MS, *et al.* 2015. Rotational and interior models for Enceladus. *DDA 46*, 400.02
Tiscareno MS and Arnault EG 2014. Wisps in the outer edge of the Keeler Gap. *Fall AGU*, P11B-3757
Tiscareno MS 2014. Time-varying geometric orbital elements of Saturn’s moons. *DPS 46*, 502.07
Tiscareno MS and Moran AE 2014. Orbit evolution of disk-embedded masses: Directly observed in Saturn’s rings. *Planetary Rings Workshop* (Boulder CO)

- Tiscareno MS** 2014. Reassessing narrow rings at Uranus and Neptune. *Ice Giants Workshop* (Laurel MD). 2033
- Tiscareno MS** and Harris BE 2014. A survey for spiral waves and other radial features in Saturn's rings. *DDA* **45**, 402.06
- Tiscareno MS, et al.** 2014. Orbit evolution of disk-embedded masses: Directly observed in Saturn's rings. *AAS* **223**, 401.01
- Tiscareno MS** and Harris BE 2013. Mapping radial features in Saturn's rings. *DPS* **45**, 206.08
- Tiscareno MS** 2013. Time-varying geometric orbital elements of Saturn's moons. *DDA* **44**, 303.04
- Tiscareno MS** 2012. Propeller peregrinations and collision clouds: Boulders moving *within* and *into* Saturn's rings. *DPS* **44**, 513.05
- Tiscareno MS, et al.** 2012. Open questions in the outer solar system: CubeSat/ChipSat opportunities? *iCubeSat2012* (Boston MA), B.1.2
- Tiscareno MS**, Hedman MM, Burns JA, and Castillo-Rogez J 2012. Compositions and origins of outer planet systems: Insights from the Roche critical density. *DDA* **43**, 8.02
- Tiscareno MS, et al.** 2011. Observations of ejecta clouds produced by impacts onto Saturn's rings. *EPSC-DPS*
- Tiscareno MS, et al.** 2011. Observations of ejecta clouds produced by impacts onto Saturn's rings. *Rings2011* (Ithaca NY)
- Nicholson PD, **Tiscareno MS**, and Spilker LJ. The Saturn Ring Observer: In situ studies of planetary rings. *Fall AGU*, P23B-1633
- Tiscareno MS, et al.** 2010. Rhea: Still ringless. *DPS* **42**, 6.04
- Tiscareno MS, et al.** 2010. Directly observing the orbital evolution of disk-embedded masses. *DDA* **41**, 11.01
- Byington BM, **Tiscareno MS, et al.** 2010. The effect of viewing geometry on propeller observations in Saturn's A ring. *DDA* **41**, 9.14
- Tiscareno MS, et al.** 2009. Observations of ejecta clouds produced by impacts onto Saturn's rings. *Fall AGU*, P54A-08
- Tiscareno MS, et al.** 2009. Rings research in the next decade. *Fall AGU*, P52A-09
- Tiscareno MS, et al.** 2009. Rings research in the next decade. *DPS* **41**, 16.32
- Tiscareno MS, et al.** 2009. Saturn's A Ring has no inner edge. *DPS* **41**, 25.04
- Burns JA, **Tiscareno MS, et al.** 2009. Giant propellers outside the Encke Gap in Saturn's rings. *DPS* **40**, 30.07
- Tiscareno MS, et al.** 2008. An analytic parameterization of self-gravity wakes. *DPS* **40**, 21.06
- Tiscareno MS**, Burns JA, and Thomas PC 2008. The rotation of Janus and Epimetheus. *DDA* **39**, 13.03
- Torrey PA, **Tiscareno MS**, Burns JA, and Porco CC. Mapping complexity: The wavy edges of the Encke and Keeler Gaps in Saturn's rings. *DDA* **39**, 15.19
- Tiscareno MS, et al.** 2007. The population of propellers in Saturn's A Ring. *DPS* **39**, 10.05
- Tiscareno MS, et al.** 2007. Numerical simulations of the G Ring arc. *DDA* **38**, 12.03
- Tiscareno MS, et al.** 2006. Density wave metamorphosis. *DPS* **38**, 38.07
- Tiscareno MS, et al.** 2006. Sampling Saturn's rings with weak density waves. *DDA* **37**, 14.06
- Tiscareno MS, et al.** 2006. Disk response to variable forcing: The rings and co-orbital satellites of Saturn. *DDA* **37**, 8.04
- Tiscareno MS, et al.** 2005. Cassini ISS observations of the Encke and Keeler Gaps in Saturn's rings. *Fall AGU*, P33B-0245
- Burns JA and **Tiscareno MS** 2005. Saturn's ring images/dynamics by Cassini. *Fall AGU*, P31D-01
- Tiscareno MS, et al.** 2005. Wavy edges and other disturbances in Saturn's Encke and Keeler Gaps. *DPS* **37**, 64.02
- Tiscareno MS, et al.** 2004. Faint rings and things according to Cassini. *Fall AGU*, P35A-1461
- Tiscareno MS** and Malhotra R 2004. Chaotic diffusion of resonant Kuiper Belt objects. *DPS* **36**, 17.08
- Burns JA, **Tiscareno MS, et al.** 2004. Weak waves and wakes in Saturn's rings: Observations by Cassini ISS. *DPS* **36**, 19.12
- Tiscareno MS** and Malhotra R 2003. The dynamics of known Centaurs. *DDA* **34**, 2.06
- Tiscareno MS** and Malhotra R 2003. The effects of planet-size resonant KBOs. *DPS* **35**, 39.22
- Tiscareno MS** and Malhotra R 2002. Centaurs: The transition between the Kuiper Belt and Jupiter-family comets. *DPS* **34**, 9.02
- Tiscareno MS** and Geissler PE 2002. Re-distribution of material on the surface of Europa via sputtering. *LPSC* **33**, 1978
- Tiscareno MS** and Porco CC 2001. Cassini ISS search for inner satellites of Jupiter. *DPS* **33**, 37.09

Press Releases and other Media-Related Activities

Featured interview, SETI Institute Facebook Live segment on 1I/Oumuamua, 31 October 2017
“Fresh findings from Cassini,” NASA and Cassini press release, October 2017
Featured interview, *Death Dive to Saturn* documentary, broadcast on PBS Nova, September 2017
Featured interview, *Saturn: Inside the Rings* documentary, broadcast on Discovery Canada and National Geographic Channel, September 2017
Featured interview, *Big Picture Science* podcast episode “Spacecraft Elegy,” 24 April 2017
Featured interview, SETI Institute Facebook Live segment on recent Cassini results, 7 April 2017
Saturn’s rings in high-def. One-slide “nugget” released internally by the Cassini Project to NASA Headquarters and the White House, April 2017.
Cassini targets propellers. One-slide “nugget” released internally by the Cassini Project to NASA Headquarters and the White House, April 2017.
“Close views show Saturn’s rings in unprecedented details,” NASA and Cassini press release, January 2017
Featured interview, *Life in Outer Space* documentary by Somadrome, broadcast on Discovery USA, January 2017
“Studying the solar system with NASA’s Webb Telescope,” NASA and SETI press release, February 2016
“Saturn’s moon Enceladus hosts a global ocean,” NASA and SETI press release, extensive media coverage, interviews with German and Australian radio programs, September 2015
“Asteroid passes by earth closer than the moon,” Televised interview with WETM (Binghamton NY), 5 Mar 2014
Impact ejecta clouds observed in Saturn’s rings, one of Cassini’s “Top 10 Science Highlights of 2013”
Cornell invites the public to “Wave at Saturn” event at the Ithaca Sciencenter, Cornell press release, media coverage, July 2013.
Cassini spies meteors crashing into Saturn’s rings. *Science* article, NASA and Cassini press release, April 2013.
Propellers recovered. One-slide “nugget” released internally by the Cassini Project to NASA Headquarters and the White House, June 2012.
Refereed review chapter on planetary rings was reviewed on *The Planetary Society Blog*, 15 December 2011:
“What do we know about planetary rings? Quite a lot, actually!” (<http://planetary.org/blog/article/00003302>)
Propellers in Saturn’s Rings. A Discoveries in Planetary Science presentation released by the AAS/DPS Education Subcommittee, April 2011.
Orbital evolution of disk-embedded ‘propeller’ moons, one of Cassini’s “Top 10 Science Highlights of 2010”
Orbital evolution of disk-embedded ‘propeller’ moons reflects solar system origins. NASA and Cassini press release, one-slide summary sent by NASA to White House Science Advisor, broad media coverage, July 2010.
Cassini images rule out rings around Rhea. Cornell press release, media coverage, July 2010.
Migrating moonlets in Saturn’s rings reflect solar system beginnings. One-slide “nugget” released internally by the Cassini Project to NASA Headquarters and the White House, June 2010.
Saturn equinox observations, including discovery of impact clouds, shadows cast by moonlets. NASA and Cassini press release, broad media coverage, September 2009.
Discovery that ‘propellers’ are confined to three narrow belts, one of Cassini’s “Top 10 Science Highlights of 2008”
Discovery of signatures of individual disk-embedded moonlets (‘propellers’). *Nature* article, *Nature* podcast interview, NASA and Cassini press release, broad media coverage, March 2006.

Education and Public Outreach

Presentation of recent Cassini results at Palo Alto Jewish Community Center, Palo Alto CA, 13 November 2018
Presentation of recent Cassini results to summer undergraduate students at the SETI Institute, Mountain View CA, 14 June 2016, 22 June 2017, 20 June 2018
Presentation of recent Cassini results to the Amateur Astronomers of San Francisco, San Francisco CA, May 2018
Presentation of recent Cassini results at Astronomy on Tap, San Francisco CA, 7 November 2017
Presentation of recent Cassini results to Rolling Hills 4-H Club, Cupertino CA, 12 October 2017
Presentation of recent Cassini results as the Benjamin Dean Astronomy Lecture, California Academy of Sciences, San Francisco CA, 11 September 2017
Presentation of the basics of solar eclipses at Bully Creek Campground (within the path of totality of the solar eclipse of 21 August 2017), Vale OR, 20 August 2017
Presentation of recent Cassini rings results as the Cassini-Huygens Analysis and Results of the Mission (CHARM) virtual public lecture, 1 September 2015, 23 August 2016
Co-led the planning of a three-hour E/PO event at the Ithaca Sciencenter to coincide with NASA’s “Wave at Saturn” campaign as the Cassini spacecraft took a portrait of Earth from Saturn orbit, 19 July 2013
Presentation of the basics of giant planets and of orbital resonances to summer undergraduate students at Cornell, 3 July 2012, 17 June 2014

Presentation of recent Cassini results to the Buffalo Astronomical Association, Buffalo NY, 13 May 2011
 Taught a class (“Introduction to the Solar System”) to twelve Ithaca-area middle-school and high-school students, 10 sessions from 2/2009 to 5/2009
 Heavily involved (including selecting images and writing captions) in preparing an exhibit of Cassini images that appeared at the American Museum of Natural History, New York City; Johnson Museum of Art, Ithaca NY; National Air and Space Museum, Washington DC; and continues to appear at museums nationwide, 2007-08
 Presentation of recent Cassini results to Ithaca-area students, 11/2008, 3/2014
 Taught a class (“Science and Faith”) at New Life Presbyterian Church, Ithaca NY, 21 sessions from 9/2006 to 5/2007, another session in 5/2015
 Presentation of recent Cassini results to visiting summer undergraduates at Cornell – 6/2010, 6/2011, 7/2012
 Presentation of recent Cassini results to high-school students visiting Cornell – 6/2005, 7/2005, 5/2007, 6/2007, 4/2008, 3/2009, 3/2010, 4/2010
 Presentation of recent Cassini results to K-12 teachers visiting Cornell for an Educator Workshop – 2/2005, 3/2007, 11/2007, 2/2009
 Presentation of recent Cassini results to Cornell alumni, 5/2005
 Presentation (“Rockets”) given to Ithaca-area students, 10/2007
 Presentation (“What is a planet? Pluto and its place in the solar system”) given to Ithaca-area students, 9/2006
 Presentation of Student Showcase research to state legislators in Phoenix, 2/2003
 Science Fair Judge, St. Michael’s Elementary School, Tucson – 2000, 2001, 2003

Mentoring of Students

I have been the primary research advisor for the following students

- Summer 2018* Jesse Modesto ’19, Physics (Cal Poly Pomona), Rings Research
- Summer 2017* Aleighn Beyene ’18, Physics (Long Beach State University), Rings Research
- Summer 2016* Brian Lopez ’17, Physics (Cal Poly Pomona), Rings Research

I have been the primary research advisor for the following students, under the supervision of Professor Burns JA

- 2013 – 2015* Allegra E. Moran ’16, Astronomy (Cornell University), Rings research
- 2013 – 2016* Ethan G. Arnault ’16, Astronomy (Cornell University), Rings research
- Summer 2014* William A. Rubert ’15, Astrophysics (Federal University of Rio Grande do Sul, Porto Alegre, Brazil), Rings research
- Summer 2014* Brandon A. Curd ’15, Astronomy (University of Oklahoma), Rings Research
- Summer 2013* Antoine Lehébel ’18 (Ph.D.), Graduate student in Fundamental Physics (Ecole Normale Supérieure de Cachan, Paris, France), Orbital dynamics research
- Summer 2012* Brent E. Harris ’14, Astrophysics (UCLA), Rings research
 Placement: Undergraduate researcher with J.-L. Margot, UCLA
- 2010 – 2012* Neil N. Sexton ’11, M.Eng. ’12, Applied & Engineering Physics (Cornell University), Rings research
- 2009 – 2011* Breanna M. Byington ’11, Physics and Education (Cornell University), Rings research
 Placement: M.A. student, Education, University of Michigan
- 2007 – 2008* Paul A. Torrey ’08, Astronomy (Cornell University), Rings research,
 Placement: Ph.D. student, Astronomy, Harvard University

In addition, I played a significant supporting role in mentoring six other undergraduate students and eight other graduate students in the Burns, Nicholson, Lunine, and Hayes research groups at Cornell University.

Teaching Experience

External Examiner at the University of Maryland, College Park MD. Sat on PhD dissertation committee for Randall Perrine, August 2011
 Visiting Lecturer at Wells College, Aurora NY, for Fall 2010 semester. Designed and taught a 3-credit lecture/lab course for undergraduate non-science majors, PHYS 106, “Introductory Astronomy”
 Guest Lecturer, Planetary Physics graduate course, Cornell University (Fall 2009, Fall 2011, Fall 2013)
 Guest Lecturer, Planetary Formation graduate course, Cornell University (Spring 2012)
 Guest Lecturer, Intermediate Dynamics graduate course, Cornell University (Fall 2011)
 Guest Lecturer, Celestial Mechanics graduate course, Cornell University (Spring 2007)
 Guest Lecturer, Space Exploration undergraduate course, Cornell University (Fall 2006, Fall 2007, Spring 2011)
 Graduate Teaching Assistant, Planetary Science for undergraduate non-science majors, University of Arizona (six semesters, Fall 1999 through Spring 2003), includes several occasions as a Guest Lecturer

Undergraduate Teaching Assistant, Geology for undergraduate non-majors, California Institute of Technology (Spring 1998)

Undergraduate Teaching Assistant, Introduction to Planetary Science for undergraduate geology/planetary majors, California Institute of Technology (Spring 1997)

Memberships

American Astronomical Society (AAS)

AAS Division for Planetary Sciences (DPS)

AAS Division on Dynamical Astronomy (DDA)

International Astronomical Union (IAU)

American Geophysical Union (AGU)

American Scientific Affiliation (ASA)

Awards and Fellowships

Certificate of Excellence in Reviewing, *Icarus*, 2013

NASA Early Career Fellowship, 2011

NASA Group Achievement Award, 2009 (co-recipient as part of the Cassini Imaging Science Team)

UA Graduate Teaching Award, 2002

LPL Graduate Teaching Award, 2002

National Science Foundation (NSF) Graduate Research Fellowship, 2000–2003

UA Graduate College Fellowship, 1999–2000

McLean Brothers Scholarship, 1994–1998