# Matthew Steven Tiscareno

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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 (J.A. Burns, Team Member), 2004 to present
Planetary Data System (PDS) Ring-Moon Systems Node, Team Member (M. Showalter, Manager), 2015 to present
Uranus Pathfinder Mission Proposal (2010, ’13, ’15), Team Member and Rings Science Lead (C. Arridge, PI)

## Recent NASA Funded Research Programs

*Saturn’s Rings: “I’m ready for my close-up”*, Cassini Data Analysis and Participating Scientists Program, 2016-2019 (PI and PS)
*Using Rotational Librations to Peer Inside Enceladus*, Cassini Data Analysis Program (transferred from Solar System Workings), 2015-2018 (PI)
*Saturn’s Rings on the Edge*, Cassini Data Analysis and Participating Scientists Program, 2013-2016 (PI and PS)
*Moons and Rings and In-Between in the Saturn System*, Outer Planets Research Program, 2010-2014 (PI)
*Saturn’s Rings and Moonlets*, Cassini Data Analysis Program, 2010-2013 (PI)
*Disk-Moon Interactions in Saturn’s Rings*, Cassini Data Analysis Program, 2008-2010 (PI)

## Service to the Science Community

Lead Editor, *Planetary Ring Systems: Properties, Structure, and Evolution*, 650-page scholarly edited volume to be published by Cambridge University Press in 2016 (C.D. Murray, co-editor)
Division Committee member, AAS Division on Dynamical Astronomy (DDA), 2014 to 2016
Member, DPS Subcommittee on Professional Culture and Climate, 2016 (C. Richey and N. Chanover, co-chairs)
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 (M. Gudipati, editor-in-chief)
Advisor, NASA Science Definition Team for Ice Giants Mission Studies, 2016 (M. Showalter, team member)
Science Organizing Committee member, 2016 DDA Meeting, Nashville TN (M. Valluri, SOC chair)
Science Organizing Committee member, 2014 DPS Meeting, Tucson AZ (F. Vilas, SOC chair)

Science Organizing Committee member, "Uranus since Voyager 2" Meeting, Meudon, France (L. Lamy, chair), September 2013
Rings Facilitator, Uranus Working Group, NASA Outer Planets Assessment Group (OPAG), October 2011
Science Program Committee member, 2011 DPS Meeting, Nantes, France (R. Malhotra and M. Grande, co-chairs)
Science/Local Organizing Committee member, Rings2011 Meeting, Ithaca NY (J.A. Burns, chair)
Science advisor to Team X technology study for future Saturn Ring Observer mission (T.R. Spilker, chair), Mar 2010 to May 2010, commissioned by the NRC Planetary Science Decadal Survey.
Local Organizing Committee member, 2008 DPS Meeting, Ithaca NY (J.F. Bell and B.E. Clark, co-chairs)
Grant Proposal Review Panels: NASA (2008, 2010, 2012, 2014), NSF (2008)
Grant Proposal External Reviews: NASA (2007-2014), German Research Foundation (2013)
Instrument Proposal External Reviews: NASA (2012)
NASA Postdoctoral Program External Reviews (2009-2010, 2012)
Manuscript Reviews: *Science, Nature, Icarus, Astronomical Journal, Astrophysical Journal, Astronomy & Astrophysics, Planetary and Space Science, Earth Moon and Planets, Geophysical Research Letters*, Springer books, Cambridge University Press books
Book Proposal Reviews: Cambridge University Press

**Community White Papers**

Diniega, S., J. Tan, **M.S. Tiscareno,** and E. Wehner 2016. Senior community members must engage in the fight against harassment. *Eos*, submitted.

**Tiscareno, M.S.,** M.R. Showalter, R.G. French, J.A. Burns, J.N. Cuzzi, I. de Pater, D.P. Hamilton, M.M. Hedman, P.D. Nicholson, D. Tamayo, A.J. Verbiscer, S.N. Milam, and J.A. Stansberry 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., H. Hammel, S. Milam, J. Stansberry, J. Lunine, N. Chanover, D. Hines, G. Sonneborn, **M.S. Tiscareno,** M. Brown, and P. Ferruit 2016. Solar system observations with the James Webb Space Telescope. *Publications of the Astronomical Society of the Pacific* **128,** 025004 (arXiv:1403.6845).

**Tiscareno, M.S.,** 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) |
|---|---|
| - | Thomas, P.C., and **M.S. Tiscareno** 2017. Small inner icy moons (and Hyperion). In R.N. Clark, C. Howett, A. Verbiscer, H. Waite, and P. Schenk, eds. *Enceladus and the Icy Moons of Saturn* (University of Arizona Press). |
| - | Spahn, F., H. Hoffmann, H. Rein, M. Sremcevic, **M.S. Tiscareno,** and M. Seiss 2016. Embedded moonlets in dense rings. In M.S. Tiscareno and C.D. Murray, eds. *Planetary Ring Systems* (Cambridge University Press). |
| - | **Tiscareno, M.S.,** and C.D. Murray 2016. The future of planetary ring studies. In M.S. Tiscareno and C.D. Murray, eds. *Planetary Ring Systems* (Cambridge University Press). |
| **11** | **Tiscareno, M.S.** 2013. Planetary rings. In T.D. Oswalt, L. French, and P. Kalas, eds. *Planets, Stars, and Stellar Systems. Volume 3: Solar and Stellar Planetary Systems* (Springer), 309-370 (arXiv:1112.3305). |
| 62 | Cuzzi, J.N., and 22 colleagues (including **M.S. Tiscareno**) 2010. An evolving view of Saturn's dynamic rings. *Science* **327,** 1470-1475. |
| 44 | Colwell, J.E., P.D. Nicholson, **M.S. Tiscareno,** C.D. Murray, R.G. French, and E.A. Marouf 2009. The structure of Saturn's rings. In M. Dougherty, L. Esposito, and T. Krimigis, eds. *Saturn from Cassini-Huygens* (Springer). |

**Refereed Journal Articles**

| Citations | Reference (Source: Google Scholar) |
|---|---|
| - | **Tiscareno, M.S.,** and B.E. Harris 2016. Mapping radial structure in Saturn's rings. *Icarus*, submitted. |
| - | **Tiscareno, M.S.,** and A.E. Moran 2016. Orbit evolution of disk-embedded masses: Directly observed in Saturn's rings. *Icarus*, submitted. |
| - | **Tiscareno, M.S.** 2016. Time-varying geometric orbital elements of Saturn's moons. *Icarus*, submitted. |
| - | Schmidt, J., J.E. Colwell, M. Lehmann, E.A. Marouf, H. Salo, F. Spahn, and **M.S. Tiscareno** 2016. On the linear damping relation for density waves in Saturn's rings. *Astrophys. J.* **824,** 33. |

1 El Moutamid, M., P.D. Nicholson, R.G. French, **M.S. Tiscareno,** C.D. Murray, M.W. Evans, C. McGhee French, M.M. Hedman, and J.A. Burns 2016. How Janus' orbital swap affects the edge of Saturn's A ring. *Icarus*, in press (arXiv:1510.00434).

17 Thomas, P.C., R. Tajeddine, **M.S. Tiscareno,** J.A. Burns, J. Joseph, T.J. Loredo, P. Helfenstein, and C. Porco 2016. Enceladus's measured physical libration requires a global subsurface ocean. *Icarus* **264,** 37 (arXiv:1509.07555).

1 Hong, Y.-C., **M.S. Tiscareno,** P.D. Nicholson, and J.I. Lunine 2015. Orbital instability of close-in exomoons in non-coplanar systems. *Mon. Not. Roy. Astron. Soc.* **449,** 828-834 (arXiv:1502.04747).

2 Lehébel, A., and **M.S. Tiscareno** 2015. Stability of rings about a triaxial primary. *Astron. Astrophys.* **576,** A92 (arXiv:1504.07807).

7 Arridge, C.S., and 113 colleagues (including **M.S. Tiscareno**) 2014. The science case for an orbital mission to Uranus: Exploring the origins and evolution of ice giant planets. *Planet. Space Sci.* **104,** 122-140.

7 Mousis, O., and 50 colleagues (including **M.S. Tiscareno**) 2014. Scientific rationale of Saturn's *in situ* exploration. *Planet. Space Sci.* **104,** 29-47 (arXiv:1404.4811).

6 Thomas, P.C., J.A. Burns, M.M. Hedman, P. Helfenstein, S. Morrison, **M.S. Tiscareno,** and J. Veverka 2013. The inner small satellites of Saturn: A variety of worlds. *Icarus* **226,** 999-1019.

**3** **Tiscareno, M.S.,** M.M. Hedman, J.A. Burns, J.W. Weiss, and C.C. Porco 2013. Probing the inner boundaries of Saturn's A ring with the Iapetus -1:0 nodal bending wave. *Icarus* **224,** 201-208 (arXiv:1302.5712).

**16** **Tiscareno, M.S.,** C.J. Mitchell, C.D. Murray, D. Di Nino, M.M. Hedman, J. Schmidt, J.A. Burns, C.C. Porco, K. Beurle, and M.W. Evans 2013. Observations of ejecta clouds produced by impacts onto Saturn's rings. *Science* **340,** 460-464.

**4** **Tiscareno, M.S.** 2013. A modified "Type I migration" model for propeller moons in Saturn's rings. *Planet. Space Sci.* **77,** 136-142 (arXiv:1206.4942).

**8** **Tiscareno, M.S.,** M.M. Hedman, J.A. Burns, and J. Castillo-Rogez 2013. Compositions and origins of outer planet systems: Insights from the Roche critical density. *Astron. J.* **765,** L28 (arXiv:1302.1253).

28 Arridge, C.S., C.B. Agnor, N. Andre, K.H. Baines, L.N. Fletcher, D. Gautier, M.D. Hofstadter, G.H. Jones, L. Lamy, Y. Langevin, O. Mousis, N. Nettelmann, C.T. Russell, T. Stallard, **M.S. Tiscareno,** G. Tobie and 63 additional colleagues 2012. Uranus Pathfinder: Exploring the origins and evolution of Ice Giant planets. *Exp. Astron.* **33,** 753-791.

25 Hedman, M.M., J.A. Burns, M.W. Evans, **M.S. Tiscareno,** and C.C. Porco 2011. Saturn's curiously corrugated C ring. *Science* **332,** 708-711.

18 Hedman, M.M., J.A. Burt, J.A. Burns, and **M.S. Tiscareno** 2010. The shape and dynamics of a heliotropic dusty ringlet in the Cassini Division. *Icarus* **210,** 284-297 (arXiv:1006.2703).

**40** **Tiscareno, M.S.,** J.A. Burns, M. Sremcevic, K. Beurle, M.M. Hedman, N.J. Cooper, A.J. Milano, M.W. Evans, C.C. Porco, J.N. Spitale, and J.W. Weiss 2010. Physical characteristics and non-keplerian orbital motion of "propeller" moons embedded in Saturn's rings. *Astrophys. J. Lett.* **718**, L92-L96 (arXiv:1007.1008).

**16** **Tiscareno, M.S.,** J.A. Burns, J.N. Cuzzi, and M.M. Hedman 2010. Cassini imaging search rules out rings around Rhea. *Geophys. Res. Lett.* **37,** L14205 (arXiv:1008.1764).

- Spilker, T.R., C.S. Borden, W. Smythe, B. Cole, A. Petropoulos, J. Dankanich, H. Kamhawi, P. Schmitz, L. Mason, J. Elliott, N. Strange, R. Moeller, P. Nicholson, **M. Tiscareno,** L. Spilker, L. Dudzinski, K. Reh, and S. Benson 2010. Saturn Ring Observer concept and architecture options. *Journal of the British Interplanetary Society* **63,** 345-350.

14 Hedman, M.M., N.J. Cooper, C.D. Murray, K. Beurle, M.W. Evans, **M.S. Tiscareno,** and J.A. Burns 2010. Aegaeon (Saturn LIII), a G ring object. *Icarus* **207,** 433-447 (arXiv:0911.0171).

**15** **Tiscareno, M.S.,** R.P. Perrine, D.C. Richardson, M.M. Hedman, J.W. Weiss, C.C. Porco, and J.A. Burns 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).

13 Morrison, S.J., P.C. Thomas, **M.S. Tiscareno,** J.A. Burns, and J. Veverka 2009. Grooves on small saturnian satellites and other objects: Characteristics and significance. *Icarus* **204**, 262-270.

**26** **Tiscareno, M.S.,** P.C. Thomas, and J.A. Burns 2009. The rotation of Janus and Epimetheus. *Icarus* **204**, 254-261 (arXiv:0904.3515).

11 Hedman, M.M., J.A. Burns, **M.S. Tiscareno,** and C.C. Porco 2009. Organizing some very tenuous things: Resonant structures in Saturn's faint rings. *Icarus* **202**, 260-279.

**24** **Tiscareno, M.S.,** and R. Malhotra 2009. Chaotic diffusion of resonant Kuiper Belt objects. *Astron. J.* **138**, 827-837 (arXiv:0807.2835).

19 Weiss, J.W., C.C. Porco, and **M.S. Tiscareno** 2009. Ring edge waves and the masses of nearby satellites. *Astron. J.* **138**, 272-286.

27 Hedman, M.M., C.D. Murray, N.J. Cooper, **M.S. Tiscareno,** K. Beurle, M.W. Evans, and J.A. Burns 2009. Three tenuous rings/arcs for three tiny moons. *Icarus* **199**, 378-386.

**57** **Tiscareno, M.S.,** J.A. Burns, M.M. Hedman, and C.C. Porco 2008. The population of propellers in Saturn's A Ring. *Astron. J.* **135**, 1083-1091 (arXiv:0710.4547).

35 Hedman, M.M., J.A. Burns, **M.S. Tiscareno,** C.C. Porco, G.H. Jones, E. Roussos, N. Krupp, C. Paranicas, and S. Kempf 2007. The source of Saturn's G Ring. *Science* **317**, 653-656.

**66** **Tiscareno, M.S.,** J.A. Burns, P.D. Nicholson, M.M. Hedman, and C.C. Porco 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).

40 Hedman, M.M., J.A. Burns, M.R. Showalter, C.C. Porco, P.D. Nicholson, A.S. Bosh, **M.S. Tiscareno,** R.H. Brown, B.J. Buratti, K.H. Baines, and R. Clark 2007. Saturn's dynamic D Ring. *Icarus* **188**, 89-107.

**23** **Tiscareno, M.S.,** P.D. Nicholson, J.A. Burns, M.M. Hedman, and C.C. Porco 2006. Unravelling temporal variability in Saturn's spiral density waves: Results and predictions. *Astrophys. J. Lett.* **651**, L65-L68 (astro-ph/0609242).

**77** **Tiscareno, M.S.,** J.A. Burns, M.M. Hedman, C.C. Porco, J.W. Weiss, L. Dones, D.C. Richardson, and C.D. Murray 2006. 100-meter-diameter moonlets in Saturn's A Ring from observations of 'propeller' structures. *Nature* **440**, 648-650.

319 Porco, C.C., and 35 colleagues (including **M.S. Tiscareno**) 2005. Imaging of Titan from the Cassini spacecraft. *Nature* **434**, 159-168.

135 Porco, C.C., and 34 colleagues (including **M.S. Tiscareno**) 2005. Cassini imaging science: Initial results on Phoebe and Iapetus. *Science* **307**, 1237-1242.

268 Porco, C.C., and 34 colleagues (including **M.S. Tiscareno**) 2005. Cassini imaging science: Initial results on Saturn's rings and small satellites. *Science* **307**, 1226-1236.

70 Porco, C.C., and 34 colleagues (including **M.S. Tiscareno**) 2005. Cassini imaging science: Initial results on Saturn's atmosphere. *Science* **307**, 1243-1247.

**84** **Tiscareno, M.S.,** and R. Malhotra 2003. The dynamics of known Centaurs. *Astron. J.* **126**, 3122-3131 (astro-ph/0211076).

274 Porco, C.C., and 23 colleagues (including **M.S. Tiscareno**) 2003. Cassini imaging of Jupiter's atmosphere, satellites, and rings. *Science* **299**, 1541-1547.

**13** **Tiscareno, M.S.,** and P.E. Geissler 2003. Can redistribution of material by sputtering explain the hemispheric dichotomy of Europa? *Icarus* **161**, 90-101.

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|---|---|---|
| Total number of citations: | First-author papers: 486 | All papers: 1931 |
| Citations per pre-2015 item: | First-author papers: 30.2 | All papers: 50.2 |
| h-index (see Wikipedia article): | First-author papers: 12 | All papers: 20 |

**Popular Articles**

**Tiscareno, M.S.** 2016. Carl Sagan. In *Dictionary of Christianity and Science* (Zondervan), submitted.

**Tiscareno, M.S.** 2016. Merton Thesis. In *Dictionary of Christianity and Science* (Zondervan), submitted.

Gauch, H.G., Jr., and **M.S. Tiscareno** 2016. Science. In *Dictionary of Christianity and Science* (Zondervan), submitted.

**Tiscareno, M.S.** 2015. Ask Astro: Can a moon have its own moon? *Astronomy* (September 2015).

**Tiscareno, M.S.** 2014. James Webb Space Telescope's astounding view of the solar system. *SPIE Newsroom* (11 April 2014), doi:10.1117/2.1201404.005406.

**Tiscareno, M.S.,** and M.M. Hedman 2013. Planetary rings. In T. Spohn, T.V. Johnson, and D. Breuer, eds. *Encyclopedia of the Solar System, 3rd edition* (Elsevier), 883-905.

**Tiscareno, M.S.,** and M.M. Hedman 2009. News and views: Saturn's colossal ring. *Nature* **461**, 1064-1065.

**Tiscareno, M.S.** 2007. Ringworld Revelations. *Sky & Telescope* **113** (2), 32-39.

**Academic Work**

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

**Invited Talks**

"Rotational and interior models for Enceladus"
17 February 2016: University of California Berkeley, Weekly Colloquium
"Dynamics of Saturn's rings and moons"
22 January 2016: University of California Santa Cruz, Weekly Colloquium
"Saturn's rings: A nearby astrophysical disk"
31 March 2015: SETI Institute, Weekly Colloquium
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, Paris, 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
15 December 2010: Fall AGU Meeting, P33D-01
"Saturn's rings: A nearby astrophysical disk"
31 January 2011: University of Idaho, Department Colloquium
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
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 58 co-author presentations are not listed.*

**Tiscareno, M.S.** 2016. Orbits and rotation states of Enceladus and other moons of Saturn. *Enceladus and the Icy Moons of Saturn Conference*

**Tiscareno, M.S.** 2016. Propeller peregrinations: Ongoing observations of disk-embedded migration in Saturn's rings. *DDA* **47,** 400.01

**Tiscareno, M.S.,** and B.E. Harris 2015. Mapping spiral waves and other radial features in Saturn's rings. *Fall AGU*, P43E-05

**Tiscareno, M.S.,** and E.G. Arnault 2015. Wisps in the outer edge of the Keeler Gap. *DPS* **47,** 104.05

**Tiscareno, M.S.,** *et al.* 2015. Rotational and interior models for Enceladus. *DDA* **46,** 400.02

**Tiscareno, M.S.,** and E.G. Arnault 2014. Wisps in the outer edge of the Keeler Gap. *Fall AGU*, P11B-3757

**Tiscareno, M.S.** 2014. Time-varying geometric orbital elements of Saturn's moons. *DPS* **46,** 502.07
**Tiscareno, M.S.** 2014. Observing planetary rings with the James Webb Space Telescope. *DPS* **46,** JWST Workshop
**Tiscareno, M.S.,** and A.E. Moran 2014. Orbit evolution of disk-embedded masses: Directly observed in Saturn's rings. *Planetary Rings Workshop*
**Tiscareno, M.S.** 2014. Reassessing narrow rings at Uranus and Neptune. *Ice Giants Workshop*. 2033
**Tiscareno, M.S.,** and B.E. Harris 2014. A survey for spiral waves and other radial features in Saturn's rings. *DDA* **45,** 402.06
**Tiscareno, M.S.,** *et al.* 2014. Orbit evolution of disk-embedded masses: Directly observed in Saturn's rings. *AAS* **223,** 401.01
**Tiscareno, M.S.,** and B.E. Harris 2013. Mapping radial features in Saturn's rings, *DPS* **45,** 206.08
**Tiscareno, M.S.** 2013. Time-varying geometric orbital elements of Saturn's moons, *DDA* **44,** 303.04
**Tiscareno, M.S.** 2012. Propeller peregrinations and collision clouds: Boulders moving *within* and *into* Saturn's rings, *DPS* **44**, 513.05
**Tiscareno, M.S.,** *et al.* 2012. Open questions in the outer solar system: CubeSat/ChipSat opportunities? *iCubeSat2012*, B.1.2
**Tiscareno, M.S.,** M.M. Hedman, J.A. Burns, and J. Castillo-Rogez 2012. Compositions and origins of outer planet systems: Insights from the Roche critical density. *DDA* **43**, 8.02
**Tiscareno, M.S.,** *et al.* 2011. Observations of ejecta clouds produced by impacts onto Saturn's rings. *EPSC-DPS*
**Tiscareno, M.S.,** *et al.* 2011. Observations of ejecta clouds produced by impacts onto Saturn's rings. *Rings2011*
Nicholson, P.D., **M.S. Tiscareno,** and L.J. Spilker. The Saturn Ring Observer: In situ studies of planetary rings. *Fall AGU*, P23B-1633
**Tiscareno, M.S.,** *et al.* 2010. Rhea: Still ringless. *DPS* **42**, 6.04
**Tiscareno, M.S.,** *et al*. 2010. Directly observing the orbital evolution of disk-embedded masses. *DDA* **41**, 11.01
Byington, B.M., **M.S. Tiscareno,** *et al.* 2010. The effect of viewing geometry on propeller observations in Saturn's A ring. *DDA* **41**, 9.14
**Tiscareno, M.S.,** *et al.* 2009. Observations of ejecta clouds produced by impacts onto Saturn's rings. *Fall AGU*, P54A-08
**Tiscareno, M.S.,** *et al.* 2009. Rings research in the next decade. *Fall AGU*, P52A-09
**Tiscareno, M.S.,** *et al.* 2009. Rings research in the next decade. *DPS* **41**, 16.32
**Tiscareno, M.S.,** *et al.* 2009. Saturn's A Ring has no inner edge. *DPS* **41**, 25.04
Burns, J.A., **M.S. Tiscareno,** *et al.* 2009. Giant propellers outside the Encke Gap in Saturn's rings. *DPS* **40**, 30.07
**Tiscareno, M.S.,** *et al.* 2008. An analytic parameterization of self-gravity wakes. *DPS* **40**, 21.06
**Tiscareno, M.S.,** J.A. Burns, and P.C. Thomas 2008. The rotation of Janus and Epimetheus. *DDA* **39**, 13.03
Torrey, P.A., **M.S. Tiscareno,** J.A. Burns, and C.C. Porco. Mapping complexity: The wavy edges of the Encke and Keeler Gaps in Saturn's rings. *DDA* **39**, 15.19
**Tiscareno, M.S.,** *et al.* 2007. The population of propellers in Saturn's A Ring. *DPS* **39**, 10.05
**Tiscareno, M.S.,** *et al.* 2007. Numerical simulations of the G Ring arc. *DDA* **38**, 12.03
**Tiscareno, M.S.,** *et al.* 2006. Density wave metamorphosis. *DPS* **38**, 38.07
**Tiscareno, M.S.,** *et al.* 2006. Sampling Saturn's rings with weak density waves. *DDA* **37**, 14.06
**Tiscareno, M.S.,** *et al.* 2006. Disk response to variable forcing: The rings and co-orbital satellites of Saturn. *DDA* **37**, 8.04
**Tiscareno, M.S.,** *et al.* 2005. Cassini ISS observations of the Encke and Keeler Gaps in Saturn's rings. *Fall AGU*, P33B-0245
Burns, J.A., and **M.S. Tiscareno** 2005. Saturn's ring images/dynamics by Cassini. *Fall AGU*, P31D-01
**Tiscareno, M.S.,** *et al.* 2005. Wavy edges and other disturbances in Saturn's Encke and Keeler Gaps. *DPS* **37**, 64.02
**Tiscareno, M.S.,** *et al.* 2004. Faint rings and things according to Cassini. *Fall AGU*, P35A-1461
**Tiscareno, M.S.,** and R. Malhotra 2004. Chaotic diffusion of resonant Kuiper Belt objects. *DPS* **36**, 17.08
Burns, J.A., **M.S. Tiscareno,** *et al.* 2004. Weak waves and wakes in Saturn's rings: Observations by Cassini ISS. *DPS* **36**, 19.12
**Tiscareno, M.S.,** and R. Malhotra 2003. The dynamics of known Centaurs. *DDA* **34**, 2.06
**Tiscareno, M.S.,** and R. Malhotra 2003. The effects of planet-size resonant KBOs. *DPS* **35**, 39.22
**Tiscareno, M.S.,** and R. Malhotra 2002. Centaurs: The transition between the Kuiper Belt and Jupiter-family comets. *DPS* **34**, 9.02
**Tiscareno, M.S.,** and P.E. Geissler 2002. Re-distribution of material on the surface of Europa via sputtering. *LPSC* **33**, 1978
**Tiscareno, M.S.,** and C.C. Porco 2001. Cassini ISS search for inner satellites of Jupiter. *DPS* **33**, 37.09

**Press Releases and other Media-Related Activities**

"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, nugget for Senior Review and public release products, 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**

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 9/06 to 5/07, several sessions planned for Spring 2015

Presentation of recent Cassini results to visiting summer undergraduates at Cornell – 6/10, 6/11, 7/12

Presentation of recent Cassini results to high-school students visiting Cornell – 6/05, 7/05, 5/07, 6/07, 4/08, 3/09, 3/10, 4/10

Presentation of recent Cassini results to K-12 teachers visiting Cornell for an Educator Workshop – 2/05, 3/07, 11/07, 2/09

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, under the supervision of Professor J.A. Burns*

| | |
|---|---|
| *Summer 2016* | Brian Lopez '17, Physics (Cal Poly Pomona), Rings Research |
| *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<br>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<br>Placement: M.A. student, Education, University of Michigan |
| *2007 – 2008* | Paul A. Torrey '08, Astronomy (Cornell University), Rings research,<br>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 (D.C. Richardson, chair), 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