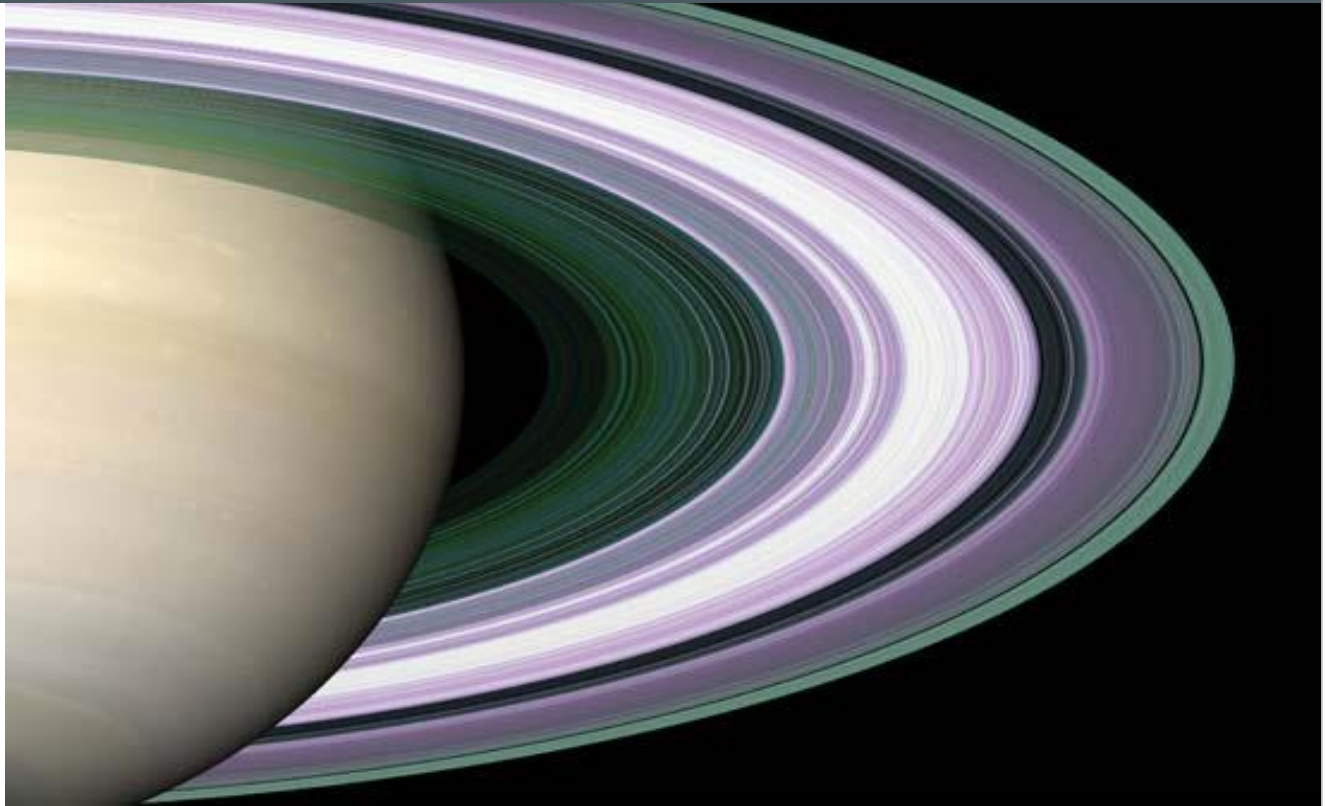


Fall 2015



DDA Dispatch



Welcome to our Newsletter

We live in an exciting time for dynamics! With exoplanets discovered almost daily, we have a rich data set to inform us about planet formation and evolution. Large-scale surveys like APOGEE are picking apart the Milky Way in unprecedented detail, and GAIA is

finding distances to a billion objects, from new asteroids, to stars, to quasars. Meanwhile, the New Horizons mission has revealed the surprising complexity of Pluto and its system of moons.

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Nashville, May 22-26

The Nashville meeting is shaping up.

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Member updates

Read member submissions on recent work and upcoming conferences.

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2016 DDA Meeting, Nashville, TN

May 22-26, 2016

Nashville meeting planning is underway. Though registration and abstract submission is still months away, local preparation is shaping up well. As the date approaches, we'll have details about the scientific program, hotel information, maps, and suggestions from locals on restaurants and outings. Here's what is in store so far.

The 2016 DDA meeting will be held on the campus of Vanderbilt University, and will feature a special lecture by Brouwer Award winner Sylvio Ferraz Mello. Vice-Chair Monica Valluri will begin contacting invited speakers this month; she plans to focus on

engaging early-career speakers and aims to build a diverse slate of topics. Invited speaker suggestions are welcome.

The local organizing committee is working with Dyer Observatory to coordinate a reception and possible public lecture night from DDA members. With a dozen hotels within walking distance to Vanderbilt, there are no plans to secure one conference hotel. Instead, we are negotiating reduced rates for several hotels through the Vanderbilt Office of Conferences.

As we prepare for the Nashville meeting, page 3 features a little background on the city. We hope you'll join us in May.

As dynamicists, our research is so diverse that the annual DDA meeting has traditionally been our main (and often only) opportunity to interact and to catch up on the new discoveries made in other subfields. One of my goals as DDA chair is to change that. We're starting this newsletter to forge a better connection between DDA members throughout the year. In our newsletter, we will update you on DDA business and future goals. We will spotlight new work done by our members, and we will feature conferences and opportunities that are of interest to our community.

Though it's early days yet, we hope to grow into a lively and informative way to keep in touch. This goal relies on you to give us feedback, and to submit your articles to publish in the DDA Dispatch. We look forward to hearing from you.

-- Kelly Holley-Bockelmann,
2016 DDA Chair

Background on 2016 Meeting Site

Nashville has emerged as a vibrant, progressive, modern city and is currently in the spotlight as the in place to be. Dubbed "Music City", "Nowville", and "Athens of the South", Nashville has consistently ranked at the top of America's most livable cities. The city boasts 14 colleges and universities, attracting over 30,000 students from all over the world. National critics are taking note of the flourishing food scene, and the music scene is simply outstanding.

Nashville has one of the largest urban park and greenway systems in the US, as well as a resurgence in urban living, with stylish lofts and high-rise apartments downtown and in the trendy Gulch. Historic Second Avenue offers lively nightlife, with restaurants, coffee shops and nightclubs in renovated warehouses. Downtown Nashville features dozens of famous bars and honky-tonks along neon-lit Broadway.

The Frist Center for the Visual Arts runs some of the world's greatest art exhibits. The Tennessee Performing Arts Center hosts traditional and avant-garde symphony, opera, ballet and theater performances. Nashville is home to the NFL Tennessee Titans and the NHL Nashville Predators, and is a reliable stop for major rock and pop concert tours. Dyer Observatory, used by E. E. Barnard and Carl Seyfert, now actively engages the public in astronomy.

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Brouwer Award winner

Professor Sylvio Ferraz Mello is internationally recognized for his many seminal contributions to dynamical astronomy, starting in the 1960s and continuing to the present day. He has made fundamental advances to our understanding of the role of resonances in the orbital dynamics in solar systems. This work uses -- and further develops -- advanced techniques in celestial mechanics to understand how resonant structures in phase space control the orbital evolution of solar system bodies. These results have wide ranging applications, from explanations of the structure of the asteroid belt in our solar system to the complicated architectures recently observed in extrasolar planetary systems. In addition, Sylvio has made fundamental contributions to our understanding of dissipative processes in solar system evolution. This work includes detailed studies of tidal friction and Stokes drag, as well as the role played by dissipation in capturing planets into mean motion resonances.

In addition to his research contributions, Sylvio has been a leader in training the next generation of researchers in celestial mechanics, in developing a vibrant community of dynamical astronomers in South America, and serving as a mentor (and role model) for researchers throughout the world. Finally, Sylvio has provided sustained and exceptional service to the community of dynamical astronomy through his role as editor of the journal *Celestial Mechanics* and through his work with the DDA.



Professor Sylvio Ferraz Mello, Universidade de São Paulo,
São Paulo, Brazil

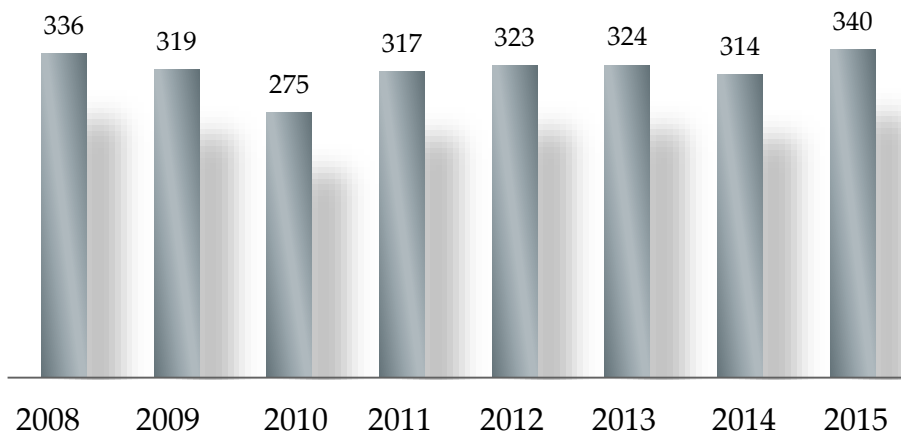
DDA Membership

The DDA membership numbers have been fairly steady over the past decade. The DDA committee will soon embark on a membership drive with the assistance of the AAS. The primary goal is to broaden participation in our Division and to increase attendance at meetings.

If you are a member of the AAS you can join the DDA (or renew your DDA membership) by paying DDA member dues at the same time. If you are not a member of the AAS but are a member of another professional society (e.g. AMS, IAU, AAAS, AGU, RAS) you are eligible to become an affiliate member of the DDA. More details are available on the Division [website](#).

You may also donate to the DDA. Donations help to support the activities of the division. Currently we are focusing on raising funds for the Raynor Duncombe Student Travel Stipends that support the attendance of graduate students at DDA meetings. For the 2015 DDA meeting in Pasadena CA we supported four talented graduate students: Juliette Becker (University of Michigan), Peter Buhler (Caltech), Gongjie Li (Harvard University) and Chris Spalding (Caltech). You can also donate to the general fund that is used to support our annual DDA meeting.

Total DDA Membership by Year



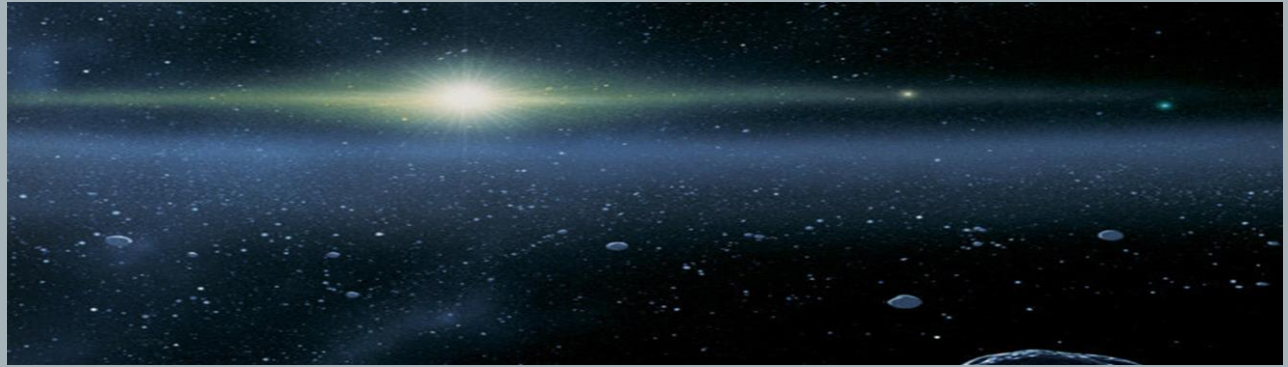
The DDA is healthy and growing -- our future goal is to broaden the membership base to increase representation from junior members and from more diverse areas of dynamics.

Member News

James Shirley (james.h.shirley@jpl.nasa.gov) reports evidence in a recent *Icarus* paper (*Icarus* **251** (2015) 128-144) of a link between solar system dynamics and global-scale dust storms on Mars. Preliminary results of the numerical modeling were presented at the 2014 AGU Fall meeting, and a more detailed paper will be submitted soon.

Darin Ragozzine (dragozzine@fit.edu) reminds us of an upcoming meeting on Extreme Solar Systems III from November 29 -- December 4 at the Waikoloa Beach Marriott Resort Spa in Hawaii. There will be a focus on dynamics, and we look forward to hearing the new results presented there -- please consider sending interesting items from the meeting to the DDA Secretary to include in our next newsletter.

Stacy McGaugh (ssm69@case.edu) and his colleagues predicted the velocity dispersions of dwarf spheroidal galaxies around Andromeda within the Modified Newtonian Dynamics framework, and recent observations are consistent with these predictions. For more information, see their work in *ApJ*, **766**, 22, 2013, *ApJ*, **775**, 139, 2013 and *MNRAS*, **440**, 908, 2014. There has also been a press release: http://blog.case.edu/think/2013/08/28/mond_predicts_dwarf_galaxy_feature_prior_to_observations that was picked up by news sites around the globe, including in the July/August of *Discover*: <http://astroweb.case.edu/ssm/mond/DiscoverJuly2015.pdf>



A feature of the Kuiper Belt known as the “kernel” has yet to be adequately explained by solar system formation models. In a recent study, David Nesvorný at the Southwest Research Institute proposes a new explanation for how Neptune arrived at its current orbit — and how this planet’s early migration might have created the kernel.



Orbital Jump

The kernel is a concentration of orbits within the Kuiper Belt that all have semi-major axes of 44 AU, low eccentricities, and low inclinations. Nesvorný proposes that the kernel resulted from Neptune’s outward migration through the solar system. In this model, Neptune began at a 24 AU and migrated rapidly outward to about 28 AU. As it traveled, it swept up bodies in the outer disk in a 2:1 resonance that migrated along with Neptune, from an original location of 40 AU out to 44 AU.

At this point, a close encounter with a fifth gas giant planet caused Neptune’s orbit to suddenly jump outward by roughly half an AU. The 2:1 population, unable to keep up, were released from the resonance with Neptune, and they remained orbiting at 44 AU, becoming the Kuiper Belt kernel. Neptune, meanwhile, continued to migrate slowly, eventually reaching its current orbit of 30 AU. Nesvorný’s previous simulations of the evolution of the outer planets, suggests that after its encounter with Neptune, the fifth planet is subsequently ejected from the solar system by Jupiter.

Adapted from AAS Nova Article by Susanna Kohler -- <http://aasnova.org/2015/09/09/explaining-the-kuiper-belt-with-a-jumping-planet/>

Published paper: David Nesvorný 2015 AJ 150 68. [doi:10.1088/0004-6256/150/3/68](https://doi.org/10.1088/0004-6256/150/3/68)

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Notes and Announcements

As a division of the AAS, the DDA abides by the AAS policy on sexual harassment as well as the AAS code of ethics. Please make note of the AAS Anti-Harassment Policy at meetings: <http://aas.org/policies/anti-harassment-policy>. A grassroots program, *Astronomy Allies*, is composed of volunteers who can listen confidentially and help if an incident occurs at an AAS meeting.

Check out the new *Astronomy Image Explorer*, an AAS-supported clearinghouse for astronomical images, video and figures. <http://www.astroexplorer.org>

We welcome your comments, article submissions and news items – please send these to the DDA secretary at dda.secretary@gmail.com. Note that an alternative address, dda.secretary@aas.org, will be available soon.

Remember to nominate your colleagues for the Brouwer Award, Duncombe Awards, and the DDA Committee. Send an email to the DDA secretary and/or the nominating committee. They will get you started with the nomination process.

DDA Officers



Fred Adams
Past Chair



Kelly Holley-Bockelmann
Chair



Monica Valluri
Vice- Chair



Sethanne Howard
Secretary



Alice Monet
Treasurer