Michael S. Petersen

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Research

Design, implement, execute, and analyse precision numerical models to understand dynamical evolution in disk galaxies and their halo environs.

Position

Postdoctoral Research Associate, working with Jorge Peñarrubia. 2019-

Education

Doctor of Philosophy, Astronomy 2019
The non-linear dynamics of barred galaxy evolution in ΛCDM
Advisors: Martin D. Weinberg, Neal Katz
Mary Dailey Irvine Grant 2016, 2017, 2018

Bachelor of Arts, Astronomy & Physics, Music 2010
Colgate University, Hamilton, NY
Astronomy & Physics Honors, Core Distinction

Collaborations

Basis-function expansion (Beefy) Collaboration
'Architect' status in a Center for Computational Astrophysics (NYC)-led collaboration (PIs: Kathryn Johnston [Columbia], Martin Weinberg [UMass]). The group is working to develop a holistic approach to galaxy evolution using basis function expansions.

SEGAL Collaboration
Assisting analysis of bars in the New Horizon simulation within the SEGAL collaboration (PI: Christophe Pichon [IAP]). The group is working to develop a holistic approach to galaxy evolution using basis function expansions.

Teaching & Advising

University of Edinburgh MPhys Research Advisor 2020-
Designed and advised a masters project at the University of Edinburgh.

University of Edinburgh Research Advisor Summer 2020
Designed, sought funding for, and advised two summer research projects for advanced undergraduate students at the University of Edinburgh.

University of Edinburgh Senior Honours Research Advisor 2019-
Designed and advised three research projects for undergraduate students at the University of Edinburgh.

Five College Astronomy Teaching Assistant 2014-2018
Assisted Professor James Lowenthal, Dr. Anne Jaskot, and Dr. Kim Ward-Duong in Observational Techniques I/II, a two-semester observing course involving a yearly observational component at Kitt Peak National Observatory. University of Massachusetts Distinguished Teaching Award finalist.

Service

Equality, Diversity and Inclusion Team Organiser 2020-
Initiated a team to study issues of equality, diversity and inclusion at the Intitute for Astronomy.

ROE Seminar Organiser 2019-
Responsible for selection of speakers and organising delivery of talks for the Royal Observatory. Includes remote organisation and hosting during work-from-home period.

Local Universe Reading Group Organiser 2019-
Responsible for programming and hosting a roughly dozen-person reading group covering multiple research teams at the ROE.

Recent Invited Talks

Institute of Astronomy (Cambridge) Dynamics Group May 2020
Bar models beyond analytic formulae

AIP Potsdam Local Universe Group January 2020
Bespoke N-body experiments in barred galaxy dynamics

University of St. Andrews January 2020
Bespoke N-body experiments in barred galaxy dynamics

Selected Observational Experience

NASA IRTF, Co-I (2018B, 2019B, 2020B), 12 nights
SpeX+MORIS Star Spot Monitoring of K2 Selected T Tauri Stars in Taurus-Auriga
iSHELL Accretion and Gas Dynamics in Transition Disk-bearing Young Stars Across the Substellar Boundary

KPNO 0.9m, PI (2016-2017), 5 nights; Co-I (2014-2018), 30 nights
Deep Imaging of Nearby Low Surface Brightness Disks
Ionization States of Green Pea Galaxies

Large Millimeter Telescope, PI (Early Science 2,3,4 2014-2016), 60 hours
Circumstellar Disk Masses in IC 348

Professional Links

Research Webpage `https://michael-petersen.github.io`

Github Code Repository `https://github.com/michael-petersen`

References

Jorge Peñarrubia
Postdoctoral Research Associate advisor.

Martin D. Weinberg
Co-dissertation advisor.

Neal Katz
Co-dissertation advisor.

Publications

Refereed Publications

7. **Petersen, M. S.** & Peñarrubia, J. *Reflex motion in the Milky Way stellar halo resulting from the Large Magellanic Cloud infall*, 2020, MNRASL, 494:11.
6. **Petersen, M. S.**, Weinberg, M. D., and Katz, N. *Using torque to understand barred galaxy models*, 2019, MNRAS, 490:3616.
5. **Petersen, M. S.**, Gutermuth, R.A., Nagel, E., Wilson, G.W., Lane, J. *Early science with the Large Millimetre Telescope: new mm-wave detections of circumstellar discs in IC 348 from LMT/AzTEC*, 2019, MNRAS, 488:1462.
4. **Petersen, M. S.**, Katz, N. , & Weinberg, M.D. *The Dynamical Response of Dark Matter to Galaxy Evolution Affects Direct-Detection Experiments*, Phys Rev D, 2016. Figure 4 was featured as part of the journal's 'Kaleidoscope'.
3. **Petersen, M. S.**, Weinberg, M. D., and Katz, N. *Dark matter trapping by stellar bars: the shadow bar* 2016 MNRAS, 463:1952–1967.
2. Bary, Jeffrey S. & **Petersen, M. S.** *Anomalous Accretion Activity and the Spotted Nature of the DQ Tau Binary System* 2014 ApJ, 792:64.
1. Elmegreen, Debra M., and others including **Petersen, M. S.** *Clumpy Galaxies in Goods and Gems: Massive Analogs of Local Dwarf Irregulars* 2009 ApJ, 701:306-329.

Publications In Review

3. **Petersen, M. S.** & Peñarrubia, J. *Detection of the Milky Way reflex motion induced by the Large Magellanic Cloud infall*
2. **Petersen, M. S.**, Weinberg, M. D., and Katz, N. *Using commensurabilities and orbit structure to understand barred galaxy evolution*, arXiv e-prints
1. **Petersen, M. S.**, Weinberg, M. D., and Katz, N. *Using harmonic decomposition to understand barred galaxy evolution*, arXiv e-prints

Publications To Be Submitted Before November 2020

1. Weinberg, M. D. & **Petersen, M. S.** *Using Multichannel Singular Spectrum Analysis to Study Galaxy Dynamics*