

# BENEDIKT DIEMER

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## EDUCATION

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<b>PhD in Astronomy</b> University of Chicago (Advisor: Andrey Kravtsov) Thesis: On the (non-)universality of halo density profiles	<i>Chicago, IL</i> 09/2009 - 08/2015
<b>Master of Physics</b> University of Manchester (third year at UC Santa Barbara)	<i>Manchester, UK</i> 09/2004 - 07/2008

## APPOINTMENTS

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<b>University of Maryland</b> Assistant Professor in the Department of Astronomy NHFP Einstein Fellow	<i>College Park, MD</i> since 08/2020 10/2019 - 07/2020
<b>Harvard-Smithsonian Center for Astrophysics (CfA)</b> NHFP Einstein Fellow Institute for Theory and Computation (ITC) Fellow	<i>Cambridge, MA</i> 08/2018 - 09/2019 09/2015 - 07/2018

## TEACHING

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Instructor, UMD ASTR 100, <i>Introduction to Astronomy</i>	Spring 2023, Fall 2023
Instructor, UMD ASTR 340, <i>Origin of the Universe</i> (non-major cosmology)	Fall 2020, Fall 2021
Instructor, UMD ASTR 620, <i>Galaxies</i> (graduate)	Spring 2024
Instructor, UMD ASTR 670, <i>ISM and gas dynamics</i> (graduate)	Spring 2021, Fall 2022, S. 2025

## RESEARCH ADVISING & MENTORING

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Katya Leidig	UMD PhD student; main adviser	since 2020
Calvin Osinga	UMD PhD student; main adviser	since 2020
Zuzanna Kocjan	UMD PhD student; main adviser	since 2023
Mark Ugalino	UMD PhD student; main adviser	since 2023
Ze'ev Vladimir	UMD Undergraduate; main research adviser	since 2022
Wenxi Wu	UMD Undergraduate; main research adviser	since 2022
Ankita Bera	UMD CTC prize fellow	since 2023
Shmuel Bialy	UMD CTC prize fellow (now faculty at Technion)	2021–2023

## NON-ACADEMIC PROFESSIONAL EXPERIENCE

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<b>jambit GmbH</b> Software Architect	08/2008 - 07/2009 <i>Munich, Germany</i>
<b>Humana People to People</b> Voluntary Development Instructor	11/2002 - 12/2003 <i>Durban, South Africa / Nacala, Mozambique</i>

## SELECTED AWARDS & GRANTS

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ResCorp Scialog Fellow, <i>Early Science with the LSST</i>	2024 - 2026
Kavli Fellow, National Academy of Sciences, <i>Frontiers of Science Symposium</i>	11/2024
NSF CAREER, <i>Towards ... constraints on the nature of DM and gravity</i> (PI, \$1M)	09/2024 - 08/2029
NSF AAG, <i>Resolving the Mechanisms of Star Formation Quenching...</i> (Co-I, \$181k)	08/2023 - 08/2026
Sloan Research Fellowship	09/2023 - 08/2025
NSF AAG, ... <i>Massive Halos with Theory and Observations</i> (PI, \$345k)	09/2022 - 08/2025
NSF AAG, <i>The Physical Halo Model</i> (Institutional PI, \$346k)	09/2022 - 08/2025
Distinguished Faculty Teaching Prize, UMD Astronomy	05/2021
NASA Einstein Fellowship	08/2018 - 07/2020
Nathan Sugarman Award for Excellence in Grad. Research, Enrico Fermi Inst.	06/2015
Arts, Science & Culture Graduate Collaboration Grant, UChicago / SAIC	11/2014
McCormick Fellowship, UChicago	09/2009 - 06/2011
Platt Prize for Theoretical Physics, University of Manchester	07/2008
Scholarship from the German Academic Foundation (Studienstiftung)	09/2007 - 07/2008

## PROFESSIONAL SERVICE

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Journal peer review	ApJ, MNRAS, A&A, JCAP, PhysDU (27 articles total)	since 2015
Review panels	Panel reviewer for NSF AAG	2020, 2023
	Reviewer for ERC Advanced Grant	2020
	Reviewer for NASA FINESST Fellowships	2018–20, 2024
Committee service	Chair, UMD Astronomy websites committee	since 2023
	Faculty liaison, UMD GRAD-MAP REU	since 2022
	UMD Strategic plan committee	2024/25
	Director, UMD Center for theory and computation (CTC)	2023/24
	UMD Departmental HPC allocation manager	since 2022
	UMD Faculty recruitment committee	2021/22, 2022/23, 2024/25
	UMD Graduate selection committee	2020/21
	ITC Fellowship Selection Committee	2016 – 2019
	ITC Visitor Committee	2017/18, 2018/19
Conference organization	Splashback Workshop at SLAC/UCSC (in collab.)	April 2019
Major public codes	<i>Colossus</i> , <i>SPARTA</i> , <i>Ulula</i>	

## OUTREACH & DEI EXPERIENCE

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Presenter, Astronomy on Tap, Washington DC	02/18/2025
Presenter, Science on Tap, College Park MD	11/06/2024
Presenter, National Capitol Astronomers	10/12/2024
Faculty liaison, GRAD-MAP (UMD minority REU program)	since 2022
Co-founder of the arts and science collaboration <i>The Fabric of the Universe</i>	since 2014
Arts and science collaboration/exhibition <i>Brains &amp; Cosmic Web</i>	2019
Presenter, Cambridge Science Festival	04/17/2019
Presenter of <i>Astronomy Conversations</i> (public outreach talks), Adler Planetarium	2011 - 2015

## SELECTED KEY PUBLICATIONS

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### **Diemer**

*A dynamics-based density profile for dark haloes - III. Parameter space*  
2025 [MNRAS 536, 1718](#) (18 pages)

### **Diemer**

*A dynamics-based density profile for dark haloes – II. Fitting function*  
2023 [MNRAS 519, 3292](#) (20 pages)

### **Diemer**

*A dynamics-based density profile for dark haloes – I. Algorithm and basic results*  
2022 [MNRAS 513, 573](#) (22 pages)

### **Diemer**

*Flybys, orbits, splashback: subhalos and the importance of the halo boundary*  
2021 [ApJ 909, 112](#) (16 pages)

### **Diemer**

*Universal at last? The splashback mass function of dark matter halos*  
2020 [ApJ 903, 87](#) (15 pages)

Tacchella, **Diemer**, Hernquist, Genel & 7 co-authors

*Morphology and star formation in IllustrisTNG: the buildup of spheroids and discs*  
2019 [MNRAS 487, 5416](#) (25 pages)

**Diemer**, Stevens, Lagos, Calette, Tacchella, Hernquist, Marinacci, Nelson & 4 co-authors

*Atomic and molecular gas in IllustrisTNG galaxies at low redshift*  
2019 [MNRAS 487, 1529](#) (22 pages)

Nelson, Springel, Pillepich & 11 co-authors (incl. **Diemer**)

*The IllustrisTNG simulations: public data release*  
2019 [Comp. Ast. 6:2](#) (29 pages)

### **Diemer & Joyce**

*An accurate physical model for halo concentrations*  
2019 [ApJ 871, 168](#) (16 pages)

### **Diemer**

*COLOSSUS: A python toolkit for cosmology, large-scale structure, and dark matter halos*  
2018 [ApJS 239, 35](#) (13 pages)

**Diemer**, Stevens, Forbes, Marinacci, Hernquist, Lagos, Sternberg & 6 co-authors

*Modeling the atomic-to-molecular transition in cosmological simulations of galaxy formation*  
2018 [ApJS 238, 33](#) (22 pages)

**Diemer**, Mansfield, Kravtsov & More

*The splashback radius of halos from particle dynamics. II. Dependence on mass, accretion rate, redshift, and cosmology*  
2017 [ApJ 843, 140](#) (16 pages)

### **Diemer**

*The splashback radius of halos from particle dynamics. I. The SPARTA algorithm*  
2017 [ApJS 231, 5](#) (20 pages)

- More, **Diemer** & Kravtsov  
*The splashback radius as a physical halo boundary and the growth of halo mass*  
[2015 ApJ 810, 36](#) (16 pages)
- Diemer** & Kravtsov  
*A universal model for halo concentrations*  
[2015 ApJ 799, 108](#) (16 pages)
- Diemer** & Kravtsov  
*Dependence of the outer density profile of halos on their mass accretion rate*  
[2014 ApJ 789, 1](#) (18 pages)
- Diemer**, More, & Kravtsov  
*The pseudo-evolution of halo mass*  
[2013 ApJ 766, 25](#) (15 pages)

## TALKS AND SEMINARS

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Physics & Astronomy Colloquium, George Mason University	03/07/2025
Colloquium, University of Minnesota	12/06/2024
Seminar, Tsinghua University, Beijing, China	11/29/2024
Seminar, Jiao Tong University, Shanghai, China	11/25/2024
GECO Seminar, LAM Marseille (remote)	10/02/2024
Seminar, INAF Bologna, Italy	09/17/2024
Geophysical and astrophysical fluid dynamics seminar, UC Santa Cruz (remote)	12/01/2023
Colloquium, Yale University	10/26/2023
ICRAR/UWA Seminar, University of Western Australia (remote)	04/06/2023
CCAPP Seminar, The Ohio State University	01/24/2023
Cluster Cosmology Group Seminar, MPE Munich	07/20/2022
Mitchell Institute Seminar, Texas A&M University	04/25/2022
Particle Physics Seminar, Brookhaven National Lab (remote)	02/17/2022
Cluster Group Seminar, University of Michigan (remote)	02/02/2022
Cosmology Seminar, Oxford University (remote)	02/01/2022
Colloquium, IRyA-UNAM Morelia, Mexico (remote)	11/06/2020
Astrophysics Seminar, Cardiff University (remote)	10/14/2020
Galaxy Crawl, University of Arizona (remote)	06/09/2020
Cosmology Seminar, MPA Munich	09/24/2019
Cosmology & Extragalactic Seminar, University College London, UK	09/11/2019
Simulation Lunch, Oxford University, UK	09/09/2019
Group Seminar, LPNHE/Sorbonne, Paris	07/04/2019
Lunch Seminar, Argonne National Lab	05/07/2019
Physics Colloquium, University of Arizona	04/26/2019
Colloquium, University of Maryland	03/27/2019
Astrophysics Seminar, UC Santa Barbara	03/21/2019
Physics Colloquium, UC Santa Barbara	03/20/2019
Galaxy Journal Club, STScI	09/21/2018
BCCP Cosmology Seminar, UC Berkeley	04/17/2018
Cosmology Seminar, Stanford University	04/16/2018
FLASH Seminar, UC Santa Cruz	11/09/2017
Colloquium, University of Michigan	10/12/2017
Theoretical Astrophysics Seminar, University of Zurich	07/14/2017
Colloquium, University Observatory Munich	07/05/2017

Astrophysics Seminar, Hebrew University	06/27/2017
A&A Seminar, Tel Aviv University	06/14/2017
TAPIR Seminar, CalTech	04/21/2017
Seminar, UC Riverside	04/19/2017
Group seminar, UCLA	04/17/2017
High-energy phenomena seminar, Harvard/CfA	04/05/2017
AstroLunch Seminar, Carnegie Mellon University	03/14/2017
Colloquium, ASIAA, Taipei	04/13/2016
APEC Seminar, Kavli IPMU, Tokyo	04/07/2016
YCAA Seminar, Yale University	10/20/2015
CIERA Seminar, Northwestern University	12/01/2014
Particle Astrophysics Seminar, Fermilab	11/10/2014
BCCP Cosmology Seminar, UC Berkeley	10/07/2014
KIPAC Cosmology Seminar, Stanford University	10/06/2014

## CONFERENCE TALKS

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245th AAS meeting, National Harbor MD <i>Cluster halos as dark matter laboratories</i>	01/16/2025
245th AAS meeting, National Harbor MD <i>Towards realistic halo-scale constraints on the nature of dark matter and gravity</i>	01/12/2025
Views on the multi-phase interstellar medium in galaxies, Bologna, Italy <i>Towards a three-phase ISM model for the largest cosmological simulations</i>	09/10/2024
Cosmic Signals of Dark Matter Physics: New Synergies, KITP, Santa Barbara <i>Towards multi-wavelength constraints of DM on halo scales</i>	06/05/2024
Alpine Cosmology Workshop, Prentau, Italy <i>A dynamics-based density profile for dark matter halos</i>	07/25/2023
The cosmic web: Connecting galaxies to cosmology, KITP, UC Santa Barbara <i>Where does the cosmic web end and the halo begin?</i>	01/10/2023
Intriguing inconsistencies in the growth of structure over cosmic time, Sesto, Italy <i>Testing the growth of structure with the structure of halos</i>	07/28/2022
Computational Astrophysics in the ngVLA Era, Flatiron Institute, New York <i>Modeling cold gas and the ISM in cosmological simulations of galaxy formation</i>	06/07/2022
Advances in Cosmology through Numerical Simulations, MIAPP Munich <i>The (overlooked?) dynamics of particles in simulations</i>	05/17/2022
Galaxy Clusters: Challenging Our Cosmological Perspectives, STScI (remote) <i>A dynamics-based model for cluster halos</i>	04/29/2022
NHFP Fellows Symposium, Washington DC <i>Modeling the interstellar medium, and other fun with cosmological hydro simulations</i>	10/22/2019
KICC 10th Anniversary Symposium, Cambridge, UK <i>The splashback radius as a physical halo boundary</i>	09/19/2019
Matera Oscura, Matera, Italy (invited review talk) <i>Dark matter in halos and large-scale structure</i>	09/05/2019

Alpine Cosmology Workshop, La Berarde, France <i>Caustics, orbits, splashback: New insights into halo dynamics and structure</i>	07/01/2019
Zoom-in and out, Nordita, Stockholm <i>Modeling HI, H<sub>2</sub>, and the ISM in cosmological simulations of galaxy formation</i>	06/20/2019
Splashback Workshop, SLAC <i>The splashback radius in everyday life</i>	04/30/2019
8th KIAS workshop on cosmology and structure formation, Seoul (invited talk) <i>Caustics, orbits, splashback: New insights on halo dynamics and structure</i>	11/06/2018
Einstein Fellows Symposium, Harvard-Smithsonian CfA <i>The splashback radius of dark matter halos</i>	10/02/2018
Santa Cruz Galaxy Workshop, UCSC <i>Modeling the atomic-to-molecular transition in cosmological simulations of galaxy formation</i>	08/07/2018
Numerical Galaxy Formation Workshop, Schloss Ringberg, Germany <i>Adventures in modeling the HI/H<sub>2</sub> transition in cosmological simulations</i>	03/21/2018
Harvard-Heidelberg star formation workshop, Cambridge MA <i>Adventures in modeling molecular gas in cosmological simulations</i>	11/15/2017
KITP Conference on the galaxy-halo connection, UCSB (invited review talk) <i>Universality, history, and circumstance: On the structure and boundary of CDM halos</i>	05/16/2017
SnowPAC, Snowbird UT (invited talk) <i>The splashback radius as a physical halo boundary</i>	03/16/2016
SnowCluster, Snowbird UT <i>On the (non-)universality of cluster density profiles and concentrations</i>	03/16/2015
Future directions in galaxy cluster surveys, Paris <i>Dependence of the density profiles of halos on their mass accretion rate</i>	06/25/2014
Fifty-One Erg Conference, Raleigh NC <i>Comparing the light curves of simulated Type Ia Supernovae with observations</i>	05/13/2013
Santa Fe Cosmology Workshop, Santa Fe NM <i>The pseudo-evolution of halo mass</i>	07/12/2012
Great Lakes Cosmology Workshop, Chicago IL <i>Confronting simulations and observations of Type Ia Supernovae</i>	06/15/2010