

# BENEDIKT DIEMER

Department of Astronomy ◊ University of Maryland ◊ College Park, MD 20742

benediktdiemer.com ◊ diemer@umd.edu

## EDUCATION

---

<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

---

<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 EXPERIENCE

---

Instructor, UMD ASTR 340, <i>Origin of the Universe</i> (cosmology for non-majors)	Fall 2020/2021
Instructor, UMD ASTR 670, <i>ISM and gas dynamics</i> (graduate)	Spring 2021, Fall 2022

## OUTREACH EXPERIENCE

---

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	April 2019
Presenter of <i>Astronomy Conversations</i> (public outreach talks), Adler Planetarium	2011 - 2015

## ADVISING & MENTORING

---

Katya Leidig	UMD PhD student; main adviser	since 2020
Calvin Osinga	UMD PhD student; main adviser	since 2020
Jakob Wachter	UMD Undergraduate; main adviser	since 2021
Shmuel Bialy	UMD postdoc fellow	since 2021
Tae-hyeon Shin	Stony Brook postdoc	since 2020
Enia Xhakaj	UCSC PhD student; comm. member, co-advising with A. Leauthaud	since 2019
Spencer Scott	Harvard senior thesis (now in industry)	2018 – 2020

## SELECTED AWARDS & GRANTS

---

NSF AAG Grant, <i>Shedding Light on the Complex and Covariant Properties of Massive Halos with Theory and Observations</i> (PI, \$345k)	09/2021 - 08/2024
NSF AAG Grant, <i>The Physical Halo Model</i> (Institutional PI, \$346k)	09/2021 - 08/2024
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 & SKILLS

---

Journal peer review	ApJ, MNRAS, A&A, JCAP, PhysDU (23 articles total)	since 2015
Review panels	Panel reviewer for NSF AAG	2020
	Reviewer for ERC Advanced Grant	2020
	Reviewer for NASA Fellowships NESSF / FINESST	2018/2019/2020
Committee service	UMD Departmental HPC allocation manager	2022/23
	UMD Faculty recruitment committee	2021/22
	UMD Graduate selection committee	2021
	UMD Equity, Diversity & Inclusion committee	2021
	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>	

## NON-ACADEMIC PROFESSIONAL EXPERIENCE

---

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

## SELECTED KEY PUBLICATIONS

---

### 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)
- 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, Miyatake, Takada, **Diemer** & nine co-authors  
*Detection of the splashback radius and halo assembly bias of massive galaxy clusters*  
 2016 *ApJ* 825, 39 (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)

## INVITED TALKS AND SEMINARS

---

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 (online presentation)	02/17/2022
Cluster Group Seminar, University of Michigan (online presentation)	02/02/2022
Cosmology Seminar, Oxford University (online presentation)	02/01/2022

Colloquium, IRyA-UNAM Morelia, Mexico (online presentation)	11/06/2020
Astrophysics Seminar, Cardiff University (online presentation)	10/14/2020
Galaxy Crawl, University of Arizona (online presentation)	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

---

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	09/19/2019

<i>The splashback radius as a physical halo boundary</i>	
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