

# M. Sten Delos

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## RESEARCH INTERESTS

November 4, 2020

Dark matter and the dynamics of self-gravitating systems

Origins of matter and structure in the Universe

## PROFESSIONAL EXPERIENCE

Sept. 2020-  
present      **Max Planck Institute for Astrophysics**      [Garching, Germany]  
Postdoctoral Fellow

## EDUCATION

May 2020      **University of North Carolina at Chapel Hill**      [Chapel Hill, NC, USA]  
Ph.D. in Physics  
Thesis: “Probing the early universe using dark matter minihalos”  
Advisor: Adrienne Erickcek

May 2015      **State University of New York at Stony Brook**      [Stony Brook, NY, USA]  
M.A. in Physics

May 2010      **University of Virginia**      [Charlottesville, VA, USA]  
B.S. in Physics and Mathematics *with Highest Distinction*

## HONORS

2019      Dissertation Completion Fellowship (UNC-Chapel Hill)  
2019      North Carolina Space Grant Graduate Research Fellowship  
2019      Kenan Trust Graduate Student Research Grant (UNC-Chapel Hill)  
2010      Sigma Pi Sigma Physics Honor Society

## PROFESSIONAL ACTIVITIES AND SERVICE

2020      Referee for *Monthly Notices of the Royal Astronomical Society*  
2018      Visiting Scholar at The Ohio State University  
2017      University of North Carolina at Chapel Hill  
Senior graduate student pre-candidacy mentoring team

## INVITED PRESENTATIONS

“Probing cosmology using dark matter microhalos.” Fermilab CPC Seminar; Batavia, IL, USA; November 2020.

“Predicting the dark matter distribution at the smallest scales.” Munich/Garching *Dark Matter Day* mini-workshop; Garching, Germany; October 2020.

“The first dark matter halos as probes of cosmology.” Institute Seminar at the Max Planck Institute for Astrophysics; Garching, Germany; October 2020.

“Probing cosmology using dark matter microhalos.” Seminar at the Perimeter Institute; Waterloo, ON, Canada; February 2020.

## PUBLICATION LIST

### *Submitted Journal Articles*

Rouzbeh Allahverdi, Mustafa A. Amin, Asher Berlin, Nicolás Bernal, Christian T. Byrnes, **M. Sten Delos**, Adrienne L. Erickcek, Miguel Escudero, Daniel G. Figueroa, Katherine Freese, *et al.* “The First Three Seconds: a Review of Possible Expansion Histories of the Early Universe.” Submitted to *The Open Journal of Astrophysics* August 2020 [arXiv:2006.16182].

### *Refereed Journal Articles*

**M. Sten Delos**, Tim Linden, and Adrienne L. Erickcek. “Breaking a dark degeneracy: The gamma-ray signature of early matter domination.” *Phys. Rev. D* **100**, 123546 (2019) [arXiv:1910.08553].

Carlos Blanco, **M. Sten Delos**, Adrienne L. Erickcek, and Dan Hooper. “Annihilation signatures of hidden sector dark matter within early-forming microhalos.” *Phys. Rev. D* **100**, 103010 (2019) [arXiv:1906.00010].

**M. Sten Delos**. “Evolution of dark matter microhalos through stellar encounters.” *Phys. Rev. D* **100**, 083529 (2019) [arXiv:1907.13133].

**M. Sten Delos**. “Tidal evolution of dark matter annihilation rates in subhalos.” *Phys. Rev. D* **100**, 063505 (2019) [arXiv:1906.10690].

**M. Sten Delos**, Margie Bruff, and Adrienne L. Erickcek. “Predicting the density profiles of the first halos.” *Phys. Rev. D* **100**, 023523 (2019) [arXiv:1905.05766].

**M. Sten Delos**, Adrienne L. Erickcek, Avery P. Bailey, and Marcelo A. Alvarez. “Density profiles of ultracompact minihalos: Implications for constraining the primordial power spectrum.” *Phys. Rev. D* **98**, 063527 (2018) [arXiv:1806.07389].

**M. Sten Delos**, Adrienne L. Erickcek, Avery P. Bailey, and Marcelo A. Alvarez. “Are ultracompact minihalos really ultracompact?” *Phys. Rev. D Rapid Communications* **97**, 041303(R) (2018) [arXiv:1712.05421].

*Conference Presentations*

**M. Sten Delos**, Adrienne L. Erickcek, and Tim Linden. “The gamma-ray signature of an early matter-dominated era.” *APS April Meeting* (2019).

**M. Sten Delos**, Adrienne L. Erickcek, and Tim Linden. “The gamma-ray signature of an early matter-dominated era.” *Eighth International Fermi Symposium* (2018).

**M. Sten Delos**, Adrienne L. Erickcek, Avery P. Bailey, and Marcelo A. Alvarez. “Accurately constraining the primordial power spectrum using minihalos.” *APS April Meeting* (2018).

**TEACHING EXPERIENCE**

**University of North Carolina at Chapel Hill** [Chapel Hill, NC, USA]

Spring 2019           Cosmology (TA)

Fall 2017            Graduate Quantum Mechanics I (TA)

Summer 2017        Introductory Calculus-based Electromagnetism and Quanta (TA)

Spring 2017         Introductory Calculus-based Electromagnetism and Quanta (TA)

Fall 2016            Introductory Calculus-based Mechanics and Relativity (TA)

**Guilford Technical Community College** [Jamestown, NC, USA]

Spring 2016         Conceptual Physics

**State University of New York at Stony Brook** [Stony Brook, NY, USA]

Spring 2012         Physics for Life Sciences I (TA)

Fall 2011            Physics for Life Sciences II (TA)

Spring 2011         Physics for Life Sciences II (TA)

Fall 2010            Physics for Life Sciences I (TA)