

Martin Snoager Sloth  
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## Education

**2003** Fil. Dr. in Theoretical Physics, University of Helsinki.  
**2000** Cand. Scient. (Master) in Physics, the Niels Bohr Institute, University of Copenhagen.  
**1997** B.Sc. in physics and mathematics, University of Copenhagen.

## Positions

**2016 -** Professor, SDU, Denmark  
**2012 - 2016** Associate Professor, SDU, Denmark  
**2011 - 2012** Maitre assistant, Theoretical physics division, University of Geneva, Switzerland  
**2009 - 2011** CERN fellow, the theory unit at CERN, Switzerland.  
**2006 - 2009** Research assistant professor, University of Aarhus, Denmark.  
**2004 - 2006** Post-doctoral researcher, University of California, Davis, USA.  
**2003 - 2004** Post-doctoral researcher, the Helsinki Institute of Physics, Finland.  
**2000 - 2003** Research assistant, University of Helsinki, Finland.

## Other affiliations

Associated Scientist, CERN

## Awards and Grants

**2016** Research project, Villum Fonden, DKK 3 mill. (€ 400.000.).  
**2011** Jr. Group Leader Fellowship grant from the Lundbeck Foundation, DKK 10 mill. (€ 1.3 mill.).  
**2010** and **2017** Awarded an honorable mention in the 2010 Gravity Research Foundation essay competition.  
**2009** Awarded CERN theory fellowship.  
**2000** Inter-Nordic Mobility scholarship from NorFA.  
**1998** Selected as official summer student at CERN

## Research interests

Cosmology, astroparticle physics, physics beyond the standard model, quantum field theory, string theory.

## Examples of Courses Taught

General relativity and cosmology (SDU)  
Advanced topics in Fundamental Physics (SDU)  
Advanced quantum mechanics (SDU)  
Laboratoire de physique IV théorique (Geneva)  
Quantum field theory in curved space with applications to cosmology (SDU & Aarhus)  
Physics beyond the Standard Model (Aarhus)  
Advanced inflation (Nordita)

## Post-docs

**2018 -** Florian Niedermann  
**2014 - 2016** McCullen Sandora  
**2013 - 2016** Jonathan Ganc  
**2012 - 2016** Rajeev Kumar Jain  
**2007 - 2009** Troels Haugbølle (joint with Steen Hannestad)

## Ph.D. Students

**2016 -** Andrea Palessandro  
**2012 - 2015** Ricardo Z. Ferreira

2006 - 2009 Philip Jarnhus (joint with Steen Hannestad)

## Academic Commissions of Trust

Boards:

Editor of JCAP (Journal of Cosmology and Astroparticle Physics)

Head of Ph.D. program in physics

EU COST action network, managing committee member

Member of the Assistant/Associate Professor promotion committee

Member of the NORDITA gravity and cosmology post-doc selection committee

Grants:

Reviewer of ERC consolidator grants; Erwin Schrodinger-Fellowships, the Austrian national science foundation; Vidi-research proposals, the Netherlands Organisation for Scientific Research (Dutch Science Council); University Research Fellowships, The Royal Society in UK.

Journals:

Acting referee for JHEP (Journal of High Energy Physics), JCAP (Journal of Cosmology and Astro-particle Physics), PRD (Physical Review D), PRL (Physical Review Letters), Classical and Quantum Gravity, Astroparticle Physics, and MNRAS (Monthly News of Royal Astronomical Society).

## Publications

### Early cosmological evolution of primordial electromagnetic fields

Kobayash, T. & Sloth, M. S., 15. Jul 2019, In : Physical Review D (Particles, Fields, Gravitation and Cosmology). 100, 2, 16 p., 023524.

### Gravitational atoms

Nielsen, N. G., Palessandro, A. & Sloth, M. S., 17. Jun 2019, In : Physical Review D. 99, 12, 123011.

### Charged planckian interacting dark matter

Garny, M., Palessandro, A., Sandora, M. & Sloth, M. S., 8. Jan 2019, In : Journal of Cosmology and Astroparticle Physics. 2019, 1, 36 p., 021.

### Patient observers and non-perturbative infrared dynamics in inflation

Ferreira, R. Z., Sandora, M. & Sloth, M. S., 2018, In : Journal of Cosmology and Astroparticle Physics. 2018, 2, 32 p., 055.

### Theory and phenomenology of Planckian interacting massive particles as dark matter

Garny, M., Palessandro, A., Sandora, M. & Sloth, M. S., 2018, In : Journal of Cosmology and Astroparticle Physics. 2018, 2, 39 p., 027.

### Asymptotic symmetries in de Sitter and inflationary spacetimes

Ferreira, R. J. Z., Sandora, M. & Sloth, M. S., 2017, In : Journal of Cosmology and Astroparticle Physics. 2017, 4, 35 p., 033.

### Is patience a virtue? Cosmic censorship of infrared effects in de Sitter

Ferreira, R. Z., Sandora, M. & Sloth, M. S., 2017, In : International Journal of Modern Physics D. 26, 12, 6 p., 1743019.

### Large Field Inflation and Gravitational Entropy

Kaloper, N., Kleban, M., Lawrence, A. & Sloth, M. S., 2016, In : Physical Review D. 93, 043510.

### On the validity of the perturbative description of axions during inflation

Ferreira, R. J. Z., Ganc, J., Noreña, J. & Sloth, M. S., 2016, In : Journal of Cosmology and Astroparticle Physics. 2016, April, 21 p.

**Planckian Interacting Massive Particles as Dark Matter**

Garny, M., Sandora, M. & Sloth, M. S., 2016, In : Physical Review Letters. 116, 10, p. 101302-1-101302-6 101302.

**Towards a Gravity Dual for the Large Scale Structure of the Universe**

Kehagias, A., Riotto, A. & Sloth, M. S., 2016, In : Fortschritte der Physik. 64, 11-12, p. 881–895

**Radiative Corrections from Heavy Fast-Roll Fields during Inflation**

Jain, R. K., Sandora, M. & Sloth, M. S., 27. Jan 2015, In : JCAP. 2015, June, 35 p., 016.

**Probing correlations of early magnetic fields using mu-distortion**

Ganc, J. & Sloth, M. S., 23. Apr 2014, In : JCAP. August

**Chaotic inflation with curvaton induced running**

Sloth, M. S., 31. Mar 2014, In : Physical Review D. 8 p.

**Inflationary Magnetogenesis without the Strong Coupling Problem II**

J. Z. Ferreira, R., Kumar Jain, R. & Sloth, M. S., 21. Mar 2014, In : JCAP. 2014, June, 1403.5516 .

**Constraints on Gauge Field Production during Inflation**

Nurmi, S. & Sloth, M. S., 2014, In : JCAP. 2014

**Universal constraints on axions from inflation**

Ferreira, R. Z. & Sloth, M. S., 2014, In : Journal of High Energy Physics. 12, 22 p.

**Inflationary magnetogenesis without the strong coupling problem**

Ferreira, R. J. Z., Jain, R. K. & Sloth, M. S., Oct 2013, In : Journal of Cosmology and Astroparticle Physics. 10, 26 p.

**On the non-Gaussian correlation of the primordial curvature perturbation with vector fields**

Kumar Jain, R. & Sloth, M. S., 2013, In : Journal of Cosmology and Astroparticle Physics. 2013, 19 p., JCAP02(2013)003.

**Consistency relation for cosmic magnetic fields**

Jain, R. K. & Sloth, M. S., 2012, In : Physical Review D. 86, 12

**Fluctuating geometries, q-observables, and infrared growth in inflationary spacetimes**

B. Giddings, S. & Sloth, M. S., 2012, In : Physical Review D. 86, 083538.

**The Kramers-Moyal Equation of the Cosmological Comoving Curvature Perturbation**

Riotto, A. & Sloth, M. S., 30. Mar 2011, In : JCAP.

**Cosmological observables, IR growth of fluctuations, and scale-dependent anisotropies**

B. Giddings, S. & Sloth, M. S., 2011, In : Phys.Rev.D. 84, 6, 7 p., 063528.

**Perturbation Theory of the Cosmological Log-Density Field**

Wang, X., Neyrinck, M., Szapudi, I., Szalay, A., Chen, X., Lesgourgues, J., Riotto, A. & Sloth, M. S., 2011, In : Astrophysical Journal Supplement Series. 735, 32, 13 p.

**Strongly Scale-dependent Non-Gaussianity**

Riotto, A. & Sloth, M. S., 15. Sep 2010, In : Phys.Rev.D.

**Cosmological diagrammatic rules**

B. Giddings, S. & Sloth, M. S., 18. May 2010, In : JCAP.

**On the Effective Equation of State of Dark Energy**

Sloth, M. S., 18. May 2010, In : Int.J.Mod.Phys.D.

**Semiclassical relations and IR effects in de Sitter and slow-roll space-times**

B. Giddings, S. & Sloth, M. S., 6. May 2010, In : JCAP.

**Non-Gaussianity from Axion Monodromy Inflation**

Hannestad, S., Haugboelle, T., R. Jarnhus, P. & Sloth, M. S., 2010, In : JCAP. 2010, 001, 15 p.

**Inflationary trispectrum from graviton exchange**

Seery, D., Sloth, M. S. & Vernizzi, F., 2009, In : Journal of Cosmology and Astroparticle Physics. 3, 0811.3934 .

**Observing trans-Planckian ripples in the primordial power spectrum with future large scale structure probes**

Hamann, J., Hannestad, S., Sloth, M. S. & Y. Y. Wong, Y., 2008, In : Journal of Cosmology and Astroparticle Physics. 9, 0807.4528 .

**On Resumming Inflationary Perturbations beyond One-loop**

Riotto, A. & Sloth, M. S., 2008, In : Journal of Cosmology and Astroparticle Physics. April

**de Sitter limit of inflation and nonlinear perturbation theory**

R. Jarnhus, P. & Sloth, M. S., 17. Sep 2007, In : JCAP.

**The Matrix Reloaded - on the Dark Energy Seesaw**

Enqvist, K., Hannestad, S. & Sloth, M. S., 22. Feb 2007, In : Phys.Rev.Lett..

**On the One Loop Corrections to Inflation II: The Consistency Relation**

Sloth, M. S., 14. Dec 2006, In : Nucl.Phys.B.

**The inflationary trispectrum**

Seery, D., E. Lidsey, J. & Sloth, M. S., 6. Oct 2006, In : JCAP.

**On the one loop corrections to inflation and the CMB anisotropies**

Sloth, M. S., 24. Apr 2006, In : Nucl.Phys. B.

**How robust are inflation model and dark matter constraints from cosmological data?**

Hamann, J., Hannestad, S., Sloth, M. S. & Y. Y. Wong, Y., 2006, In : Physical Review D. 75, 2, 9 p., 023522.

**Suppressing Super-Horizon Curvature Perturbations?**

Sloth, M. S., 27. Jul 2005, In : Mod.Phys.Lett. A.

**Searching for a holographic connection between dark energy and the low- $l$  CMB multipoles**

Enqvist, K., Hannestad, S. & Sloth, M. S., 12. Sep 2004, In : JCAP.

**A CMB/Dark Energy Cosmic Duality**

Enqvist, K. & Sloth, M. S., 2. Jun 2004, In : Phys.Rev.Lett..

**Holographic bounds on the UV cutoff scale in inflationary cosmology**

Keski-Vakkuri, E. & Sloth, M. S., 9. Jun 2003, In : JCAP.

### **Superhorizon curvaton amplitude in inflation and pre-big bang cosmology**

Sloth, M. S., 27. Aug 2002, In : Nucl.Phys. B.

### **Trans-Planckian Effects in Inflationary Cosmology and the Modified Uncertainty Principle**

F. Hassan, S. & Sloth, M. S., 15. Apr 2002, In : Nucl.Phys. B.

### **Adiabatic CMB perturbations in pre-big bang string cosmology**

Enqvist, K. & Sloth, M. S., 24. Sep 2001, In : Nucl.Phys. B.

## **Press clippings**

### **I begyndelsen**

Martin Snoager Sloth

28/03/2019

1 Media contribution

### **I begyndelsen**

Martin Snoager Sloth

28/03/2019

1 Media contribution

### **Fortalt: leder efter forklaring på Big Bang**

Martin Snoager Sloth

05/08/2018

1 Media contribution

### **WIMP alternatives...**

Martin Snoager Sloth

14/05/2018

1 Media contribution

### **Martin og Big Bang**

Martin Snoager Sloth

11/03/2018

1 item of Media coverage

### **AKTUELLE: Forskning i universets fødsel**

Martin Snoager Sloth

20/07/2016

1 item of Media coverage

### **Innovation på arabisk**

Nina Dietz Legind, Jan Hartvigsen, Martin Snoager Sloth, Thomas Schmidt & Peter Seeberg

08/04/2016

1 item of Media coverage

### **Ny dansk teori: Mørkt stof består af ekstremt supertunge partikler**

Martin Snoager Sloth

29/03/2016

1 item of Media coverage

### **Her er et nyt bud på, hvad universets mørke stof består af**

Martin Snoager Sloth

15/03/2016

1 item of Media coverage

**The Heavy Limit of Dark Matter**

Martin Snoager Sloth

10/03/2016

1 item of Media coverage

**Der står fronten**

Martin Snoager Sloth

30/10/2015

1 item of Media coverage

**Nyt lys over oldgammelt spørgsmål**

Martin Snoager Sloth

22/02/2014

1 item of Media coverage

**Mange nye svar afføder endnu flere spørgsmål**

Martin Snoager Sloth

17/08/2013

1 item of Media coverage

**Apropos... begyndelse**

Martin Snoager Sloth

12/08/2013

1 item of Media coverage

**Clearing up a Big Bang mystery**

Martin Snoager Sloth

18/01/2012

1 item of Media coverage

**Big Bang endevendes af dansk forsker**

Martin Snoager Sloth

30/12/2011

1 item of Media coverage

**Var der noget før Big Bang?**

Martin Snoager Sloth

30/12/2011

1 item of Media coverage

**Hvad kom før Big Bang?**

Martin Snoager Sloth

18/11/2011

1 item of Media coverage

**Hvad kom før Big Bang?**

Martin Snoager Sloth

20/03/2011

1 item of Media coverage

**'Seesaw' explains light dark-energy particles**

Martin Snoager Sloth

31/07/2007

1 item of Media coverage

## Teaching Portfolio

Educational training: obligatory training course in professional pedagogical skills, Aarhus U. 2007-2008

### **Administrative tasks relating to education:**

- Head of PhD program in Physics at FKF, SDU since 2012.
- Member of PhD committees at SDU and other European universities.
- Member of the Danish External Examiners Board in Physics.
- Organisation and design of courses at SDU.
- Initiated the astronomy specialisation at SDU
- Responsible for further education program in astronomy for high school teachers

### **Experience:**

- Has taught a large number of courses from basic to highly specialised level.
- Supervised large a number of bachelor students, master students, PhD students and Post-doc researchers.

### **Courses taught:**

Advanced quantum mechanics, general relativity and cosmology, advanced research topics in fundamental physics, introduction to astronomy, physics for biologists, advanced inflation, quantum field theory in curved space with applications to cosmology, physics beyond the standard model, laboratoire de physique IV thorique.