

Anna Ijjas

Max Planck Institute for Gravitational Physics (Albert Einstein Institute) - Hannover, 30167, Germany |
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academic appointments

- 2019– **Permanent Scientific Staff Member & Lise Meitner Research Group Leader.**
Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Hannover, Germany
- 2019– **Visiting Research Scholar.**
Department of Physics, Princeton University, Princeton, NJ
- 2017–19 **Simons Fellow**, (with the university rank of Associate Research Scientist).
Institute for Theory and Computation, Harvard University, Cambridge, MA (2018/19) &
Center for Theoretical Physics, Columbia University, New York, NY (2017/18)
- 2014–17 **John A. Wheeler Postdoctoral Fellow.**
Princeton Center for Theoretical Science, Princeton, NJ

education

- 2014 **PhD, Theoretical Physics**
Max Planck Institute for Gravitational Physics & Humboldt University, Berlin, Germany
thesis title: Observational and Theoretical Issues in Early Universe Cosmology
advisors: Hermann Nicolai (Albert Einstein Institute), Avi Loeb (Harvard)
- 2012–14 Fritz Thyssen Graduate Research Fellow
Harvard-Smithsonian Center for Astrophysics, Cambridge, MA &
Department of Physics, Princeton University, Princeton, NJ
- 2010 **PhD, Philosophy of Physics**
Ludwig-Maximilians-University, Munich, Germany
thesis title: The Old One with the Dice: On the Metaphysics of Quantum Mechanics
awarded with the Doctoral Dissertation Prize of Munich University (2011) & the Research Prize of the
European Society for the Study of Science and Theology (2012)
- 2009 **Staatsexamen in Physics** (combined BA+MA equivalent)
Ludwig-Maximilians-University, Munich, Germany
- 2008 **Staatsexamen in Mathematics and Religious Studies** (combined BA+MA equivalent)
Ludwig-Maximilians-University, Munich, Germany

grants

- 2017-21 Simons Foundation, New York, NY
\$ 931,258 **Principal Investigator**, 'Cosmological Bounces and Bouncing Cosmologies,'
as part of the 'Origins of the Universe' Initiative
- 2012-13 Fritz Thyssen Foundation, Cologne, Germany
\$ 40,000 **Principal Investigator**, 'Fine-tuning of Initial Conditions in Cosmic Inflation,'

collaboration

- 2017- Simons Observatory

awards, scholarships

- 2016–17 John A. Wheeler Postdoctoral Fellowship of the Princeton Center for Theoretical Science
- 2014–17 Postdoctoral Fellowship of the Princeton Center for Theoretical Science
- 2013–14 Rutgers Philosophy & Cosmology Research Fellowship
 - 2012 Research Prize of the European Society for the Study of Science and Theology
 - 2011 Doctoral Dissertation Award of Ludwig-Maximilians-University (Munich)
 - 2009 Scholarship of Ludwig-Maximilians-University (Munich) for outstanding academic achievement

service to the profession/outreach

conference and workshop organization:

- 2018–19 International Summer Workshop *Current Themes in Cosmology and Numerical General Relativity*, Sesto, South Tyrol & Venice, Italy.
- 2017–18 Simons-PCTS Program *Gravity in the Early Universe*, including a series of monthly seminars and a winter workshop in Princeton, NJ and a summer workshop in Salzburg (Austria).
- 2016–17 *Bangs, bounces, black holes and bubbles: where General Relativity meets Cosmology*. PCTS Program in collaboration with the Max-Planck Institute for Gravitational Physics including a Winter Conference at Schloss Ringberg in the Bavarian Alps and a Spring Conference in Princeton, NJ.
- 2015–16 PCTS Program *Rethinking Cosmology*. including a series of monthly meetings, a lecture for the public, and a Summer Conference in Princeton, NJ.

other service:

- 2014–16 **chair**, Gravity Group Lunch Seminar, Department of Physics, Princeton University, Princeton, NJ.
- Spring 2016 **chair**, PCTS Lunch Seminar
- 2013 **lecturer**, Summer Institute in Philosophy and Cosmology including lectures for the public [joint project of Rutgers, Columbia, and UC Santa Cruz], Santa Cruz, CA.
- regular referee**, Nature, Physical Review Letters, Physical Review D, Physics Letters B, Journal of Cosmology and Astroparticle Physics, Journal of High Energy Physics, Classical and Quantum Gravity, Annals of Physics, Monthly Notices of the Royal Astronomical Society, Foundations of Physics, The European Physical Journal C

teaching experience

Harvard University, Cambridge, MA:

- Spring 2014 Introduction to Cosmic Inflation: Principles and Challenges
[invited lectures as part of the graduate class 'Topics in Contemporary Astrophysics']

Rutgers, The State University of New Jersey, New Brunswick:

- Spring 2014 'Philosophy of Science & Foundations of Cosmology for Non-Scientists' [Undergraduate Course]

Ludwig Maximilians University, Munich:

- Winter 2011 'Introduction to the Scientific Method' [Undergraduate Course]
- 'The Mind-Body-Problem' [Graduate Course]
- Summer 2011 'Foundational Problems of Quantum Mechanics' [Graduate Course]

graduate student & postdoc mentoring

Princeton University, Princeton, NJ:

William Cook, Roman Kolevatov, Nicolai Sukhov, Justin Ripley, Aaron Levy

publications

pre-print(s) **A. Ijjas**, P.J. Steinhardt. *A new kind of cyclic universe*, [arXiv:1904.08022](#).

refereed P. Ade et al. (including **A. Ijjas**). *The Simons Observatory: Science goals and forecasts*, JCAP 02 (2019) 056, [arXiv:1808.07445](#).

journal articles

A. Ijjas, F. Pretorius, P.J. Steinhardt. *Stability and the Gauge Problem in Non-Perturbative Cosmology*, JCAP 01 (2019) 015, [arXiv:1809.07010](#).

A. Ijjas, P.J. Steinhardt. *Bouncing Cosmology made simple*, Class. Quantum Grav. 35 (2018) 135004, as ‘editor’s suggestion,’ [arXiv:1803.01961](#).

A. Ijjas. *Space-time slicing in Horndeski theories and its implications for non-singular bouncing solutions*, JCAP 02 (2018) 007; featured in *Quanta Magazine* January 31, 2018; *Columbia Magazine* Spring/Summer 2018, [arXiv:1710.05990](#).

A. Ijjas. *Cyclic completion of the anamorphic universe*, Class. Quantum Grav. 35 (2018) 075010, [arXiv:1610.02752](#).

A. Ijjas, P.J. Steinhardt. *Fully stable cosmological solutions with a non-singular classical bounce*, Phys. Lett. B 764 (2017) 289-294, [arXiv:1609.01253](#).

A. Ijjas, P.J. Steinhardt. *Classically stable non-singular cosmological bounces*, Phys. Rev. Lett. 117 (2016) 121304, [arXiv:1606.08880](#).

A. Ijjas, J. Ripley, P.J. Steinhardt. *NEC violation in mimetic cosmology revisited*, Phys. Lett. B 760 (2016) 132-138, [arXiv:1604.08586](#).

A. Ijjas, P.J. Steinhardt. *Implications of Planck2015 for inflationary, ekpyrotic and anamorphic bouncing cosmologies*, Class. Quantum Grav. 33 (2016) 044001, [arXiv:1512.09010](#). [invited contribution]

A. Ijjas, P.J. Steinhardt. *The anamorphic universe*, JCAP 10 (2015) 001, [arXiv:1507.03875](#).

A. Levy, **A. Ijjas**, and P.J. Steinhardt. *Scale-invariant perturbations in ekpyrotic cosmologies without fine-tuning of initial conditions*, Phys. Rev. D. 92 (2015) 063524, [arXiv:1506.01011](#).

A. Ijjas, J.-L. Lehners, and P.J. Steinhardt. *A general mechanism for producing scale-invariant perturbations and small non-Gaussianity in ekpyrotic models*, Phys. Rev. D. 89 (2014) 123520, [arXiv:1404.1265](#).

A. Ijjas, P.J. Steinhardt, and A. Loeb. *Inflationary schism*, Phys. Lett. B 736 (2014), pp. 142–146, [arXiv:1402.6980](#).

A. Ijjas, P.J. Steinhardt, and A. Loeb. *Scale-free primordial cosmology*, Phys. Rev. D 89 (2014) 023525, [arXiv:1309.4480](#).

A. Ijjas, P.J. Steinhardt, and A. Loeb. *Inflationary paradigm in trouble after Planck2013*, Phys. Lett. B 723 (2013) 261–266; featured in *New Scientist* 2937 (2013) 38–41 and *Quanta Magazine* 01/30, 2015.

other **A. Ijjas**, P.J. Steinhardt, A. Loeb. *Pop goes the universe*, Scientific American, February 1, 2017. [invited publications feature article]

A. Ijjas, P.J. Steinhardt. *Do we live in an anamorphic universe?* PBS NOVA: The Nature of Reality 01/2016. [invited feature article]

* Philosophy of Science:

books **A. Ijjas** & B. Loewer (eds). *Introduction to the Philosophy of Cosmology* (under contract with Oxford University Press to appear in 2020)

A. Ijjas. *Der Alte mit dem Wuerfel. Ein Beitrag zur Metaphysik der Quantenmechanik*, Goettingen: Vandenhoeck & Ruprecht 2011, pp. 223. [in German, English title: The old one with the dice: a contribution to the metaphysics of quantum mechanics]

refereed **A. Ijjas**. *A-Time Beats No Time: A Response to Brian Leftow*, in: European Journal for Philosophy of Religion 5 (2013) pp.85–100.

articles

A. Ijjas, J. Groessl, and L. Jaskolla. *Theistic Multiverse and Slippery Slopes: A Response to Klaas Kraay*, in: Theology and Science 11 (2013) pp.62–76.

selected recent talks and presentations

- Aug 2019 *TBD*, International Conference *Current Themes in Gravitational Physics*, Copenhagen, DK
- Jun 2019 *Explaining the early universe: a comparative review of competing paradigms*, International Conference *CosmoGold*, IAP Paris, France
- May 2019 *Big Bang vs Big Bounce, and how to take a stance*, International Conference *New Directions in the Foundations of Physics*, Viterbo, Italy
- Mar 2019 *Cosmology with a Bounce*, International Symposium *Understanding Our Place in the Cosmos*, Jerusalem, Israel
- Feb 2019 *Big Bang vs Big Bounce*, Physics Colloquium, Brown University, Providence, RI
- Feb 2019 *Big Bang vs Big Bounce*, Physics Colloquium, Syracuse University, Syracuse, NY
- Jan 2019 *(Re)Connecting Cosmology and General Relativity*, High-Energy Physics Seminar, California Institute of Technology, Pasadena, CA
- Oct 2018 *Stability and the Gauge Problem in Early-Universe Cosmology*, TEP Seminar, Bhaumik Institute for Theoretical Physics, UCLA, Los Angeles, CA
- Oct 2018 *Bouncing Cosmology: Basics and Recent Progress*, AEI Colloquium, Max-Planck-Institute for Gravitational Physics, Hannover, Germany
- Sept 2018 *Advances in constructing smooth cosmological bounces* [PI keynote], 'Origins of the Universe' Annual Conference, Simons Foundation, New York, NY
- Jul 2018 *New frontiers in early-universe cosmology and numerical general relativity*, Lise Meitner Symposium of the Max Planck Society, Harnack Haus, Berlin, Germany
- Jul 2018 *Introduction to recent advances & open issues in bouncing cosmologies*, Simons Workshop 'Frontiers in Cosmology and Numerical Relativity,' Salzburg, Austria
- April 2018 *Space-time slicing in Horndeski theories and its implications for non-singular bouncing solutions*, High-Energy Theory/Cosmology Seminar, Johns Hopkins University, Baltimore, MD
- Mar 2018 *Expected CMB polarization signals in Bouncing Cosmologies*, KISS workshop 'Designing Future CMB Experiments,' California Institute of Technology, Pasadena, CA
- Mar 2018 *Bouncing Cosmology made simple*, Statistical Cosmology Seminar, Flatiron Institute, New York, NY
- Feb 2018 *Cosmology without a Big Bang*, Physics Colloquium, University of Chicago, Chicago, IL
- Oct 2017 *Towards a non-singular bouncing cosmology*, BHI Colloquium, Harvard University, Cambridge, MA
- Feb 2017 *(Not so) No-Goes in Bouncing Cosmologies*, Theory Seminar, Columbia University, New York, NY
- Feb 2017 *Bouncing*, Physics Colloquium, University of Virginia, Charlottesville, VA
- Jan 2017 *Bouncing*, Physics Colloquium, University of Washington, Seattle, WA
- Dec 2016 *Bouncing*, Physics Colloquium, Perimeter Institute for Theoretical Physics, Waterloo, ON
- Sep 2016 *Fully stable cosmological solutions with a non-singular classical bounce*, Simplicity II Theory Workshop, Fermilab, Batavia, IL
- Mar 2016 *Rethinking cosmology*, High-Energy Theory Seminar, The City College of New York, New York, NY
- Dec 2015 *Anamorphic cosmology*, Harvard-ITC Colloquium, Cambridge, MA
- June 2015 *Introduction to the anamorphic universe*, Gravitation and Cosmology Seminar, Perimeter Institute for Theoretical Physics, Waterloo, ON
- Dec 2014 *Scale-invariant perturbations in ekpyrotic cosmologies without fine-tuning of initial conditions*, Particle Physics Seminar, University of California Berkeley, CA

references

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Frans Pretorius

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V. (Slava) Mukhanov

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Princeton, NJ, April 28, 2019