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Anastasia Fialkov

Curriculum Vitae

Office address: Institute for Theory & Computation
Harvard University
60 Garden Street, MS-51, Room P-238
Cambridge, MA 02138

Web: <http://www.astro.tau.ac.il/~fialkov>

Email: anastasia.fialkov@cfa.harvard.edu

Place of birth: Karaganda, Kazakhstan

Nationality: Israel

Languages: Russian (mother tongue), English (fluent), Hebrew (fluent),
Spanish (intermediate B2, Tel Aviv University and Instituto Cervantes, DELE B2),
Italian (intermediate B2, Tel Aviv University),
French (intermediate B11, Sorbonne).

Research Interests

Cosmology, structure formation in the early Universe, reionization, the 21-cm signal of neutral hydrogen, gravitational lensing, CMB, dark matter.

Education

- 2008 - 2013 Ph.D. in Physics (conferred on 21.11.2013),
Department of High Energy Physics, Tel Aviv University, Tel Aviv
Thesis: "Observing the Unobservable: Catching a Glimpse of the Primordial Universe"
Advisors: Prof. Rennan Barkana and Prof. Nissan Itzhaki.
- 2006 - 2008 M.Sc. in Physics, admitted to the direct Ph.D. program in 2008,
Department of High Energy Physics, Tel Aviv University, Tel Aviv.
- 2001 - 2006 B.Sc. in Physics (Cum Laude),
Department of Physics, The Technion, Haifa.
- 2001 - 2006 B.A. in Electrical Engineering (Cum Laude),
Department of Electrical Engineering, The Technion, Haifa
Specialization in Digital Signal Processing and Electro Optics.
- 2003 The Emma and Oscar Getz Summer Science Program,
The Particle Physics Department, Weizmann Institute of Science,
Rehovot
Advisor: Prof. Itzhak Tserruya.

Positions

- September 2015 -present ITC Fellow
Institute for Theory and Computation
at the Harvard-Smithsonian Center for Astrophysics, Cambridge, MA
- September 2013 - August 2015 Junior Research Chair Fellow
at the International Center for fundamental physics,
Ecole Normale Superieure, Paris

Visiting Positions

- September 2015 - September 2016 Visiting Research Fellow,
Observatoire de Paris, Laboratoire d'Etudes du Rayonnement
et de la Matière en Astrophysique et Atmospheres (LERMA)
Collaboration with Prof. Philippe Zarka and Prof. Benoit Semelin
NenuFAR project.
- March 2015 - March 2018 Visiting Research Fellow,
School of Mathematical and Physical Sciences
Department of Physics and Astronomy at Sussex University,
Collaboration with Prof. Ilian Iliev.
- December 2014 Visitor at Sussex University,
Collaboration with Prof. Ilian Iliev.
- November 2014 Visitor at Johns Hopkins University,
Collaboration with Prof. Joe Silk and Prof. Marc Kamionkowski.
- May 2014 Visiting Scholar at Harvard-Smithsonian Center For Astrophysics,
Collaboration with Prof. Avi Loeb
Relevant paper: A. Fialkov & A. Loeb, arXiv:15020.3141 (2015).
- August 2013 Visiting Scholar at Harvard-Smithsonian Center For Astrophysics,
Collaboration with Prof. Avi Loeb
Relevant paper: A. Fialkov & A. Loeb, JCAP, 11, 066 (2013).

Fellowship, Honors and Awards

ITC fellowship at Harvard for 2015-2018 (accepted).

IAS membership for 2015-2018 (declined).

Center for Cosmological Studies Fellowship, Oxford. Realized at Johns Hopkins University, November 2014.

Participant of the Raymond and Beverly Sackler Tel-Aviv University Harvard/ITC Astronomy Program, August 2013.

Laureate of 2012 Junior Research Chair program at the International Center for fundamental physics at Ecole Normale Superieure.

Excellence in Research, Getty Foundation, School of Physics and Astronomy, Tel-Aviv University 2012.

Excellence in Study, Dean of the Faculty of Electrical Engineering, the Technion, 2001, 2002, 2003.

Conference Organization Committees

Co-Organizer of the "Cosmology and First Light: A conference at the IAP in Paris", Dec. 7-10, 2015, sponsored by the Institute Lagrange de Paris (ILP).

Co-Organizer of the "NenuFAR: status and prospects for 21-cm observations", 30 March 2015. Workshop, sponsored by the Institute Lagrange de Paris (ILP).

Collaboration Memberships

Member of DAT (Dark Age Telescope) since 2015.

Member of the DARE working group since 2015.

Core member of the SKA Cosmic Dawn/Epoch of Reionization Science Working Group since 2015. Participation in the SKA meetings in Stockholm (August 2015), Groningen (October 2015).

Member of "Multi-scale simulations of cosmic reionization" project since 2014. Computational resources: 14M core-hours on Mare Nostrum.

Member of NenuFAR (New extension in Nancay upgrading LOFAR, official SKA pathfinder since 2014) Cosmic Dawn and Dark Ages since 2013. Chapter in the Science Case of NenuFAR (2014), contribution in collaboration with L. Koopmans (Kapteyn University) & B. Semelin (LERMA, Paris), *Prospects for the Epoch of Reionization and Cosmic Dawn observations with NenuFAR*.

Observational and Computational Proposals (as Co-I)

1. Keck proposal "Dark Age Telescope - DAT" (2015, submitted). Project leader L. Greenhill (Harvard College Observatory, Smithsonian Astrophysical Observatory).
2. ANR Proposal "The low-frequency radio imager NenuFAR" (2015, submitted). Project leader P. Zarka (LESIA, Observatoire de Paris).
3. Prace proposal "Multi-scale simulations of cosmic reionization" (2015, approved). Project leader I. Iliev (University of Sussex).

Services

Referee for *Astrophysical Journal*, *Monthly Notices of the Royal Astronomical Society*.

Co-organizer of the ITC Luncheon together with Avi Loeb. Since spring 2016 (Harvard).

Mentoring

- Spring 2015 Undergraduate project of Oliver Leicht,
co-adviser Prof. Matthias Bartelmann (University of Heidelberg),
Thesis: "Gravitational lensing and dust extinction impact on luminosity functions".
- 2014-present Co-advising PhD. student Aviad Cohen,
adviser Prof. Rennan Barkana at Tel Aviv University.
Relevant paper: A. Cohen, A. Fialkov, R. Barkana, in preparation.
- 2013-2014 Co-advising master student Aviad Cohen,
adviser Prof. Rennan Barkana at Tel Aviv University.
Relevant paper: A. Fialkov, R. Barkana, A. Cohen, PRL (2015) 114, 1303.
- 2012-2013 Co-advising undergraduate project of Aviad Cohen,
adviser Prof. Rennan Barkana at Tel Aviv University.
- Summer 2012 Co-advising summer student projects of Arazi Pinhas, Amir Levi and Aviad Cohen,
adviser Prof. Rennan Barkana at Tel Aviv University.
Relevant paper: A. Fialkov, R. Barkana, A. Pinhas, E. Visbal, MNRAS (2014) 437 36.

Teaching

- 2014, Fall Teaching assistant in "General Relativity", Ecole Normale Superieure, Paris.
- 2013, Fall Teaching assistant in "General Relativity", Ecole Normale Superieure, Paris.
- 2011 - 2012 Teaching assistant in "Physics A",
School of Physics and Astronomy, Tel Aviv University, Tel Aviv.
- 2008 - 2010 Teaching assistant in "Waves, Light and Optics",
School of Physics and Astronomy, Tel Aviv University, Tel Aviv.
- 2006 - 2010 Teaching assistant in "Laboratory A",
School of Physics and Astronomy, Tel Aviv University, Tel Aviv.
- 2001, Summer Teaching assistant in Mechina (pre-College study for high-school graduates),
The Technion, Haifa.

Outreach

Invited participant in the round-table discussion “The Future of Aviation organized by Scientific American and hosted by the 51st Paris Air Show, Le Bourget, June 2015.

Seminaire de la FIP at Ecole Normale Superieure for undergraduate physics students, February 2015
“Discovering the Universe. Contemporary research in cosmology and astrophysics”.

Seminaire de la FIP at Ecole Normale Superieure for undergraduate physics students, March 2014
“Discovering the Universe. Contemporary research in cosmology and astrophysics”.

Instructor in the Israel National Museum of Science (MadaTech), 2002-2003.

Laboratory assistant in the Bose-Einstein Condensate Lab, Department of Physics, The Technion, Haifa
Head of the laboratory: Jeff Steinhauer, 2005.

Invited Conference Talks

“**Signal from the Cosmic Dawn**”, Physics of Reionization and the Cosmic Dawn in the SKA Era, Sexten Center for Astrophysics (CfA), Sesto, Italy, January 2016.

“**The Effect of First X-ray Sources on Cosmic Observables**”, Cosmology and First Light, Lagrange Institute, Institute d’astrophysique de Paris, Paris, December 2015.

“**Constraints on Warm Dark Matter scenarios from first galaxies, reionization and neutral hydrogen signal**”, The Autumn Scientific Culture Open Session 2015 of the Chalonge School, Observatoire de Paris, Paris, France, November 2016.

“**The Pre-Reionization 21-cm Signal**”, Preparing for the 21-cm cosmology revolution, Irvine, October 2015.

“**Signatures and constraints on Warm Dark Matter scenarios from reionization, 21-cm, first galaxies**”, Ecole Chalonge 19th Paris Cosmology Colloquium 2015 in honor of Hector de Vega, Paris, France, July 2015.

“**Astrophysical signatures of Warm Dark matter**”, Chalonge Meudon Workshop 2015, Warm Dark Matter Cosmology in agreement with observations: CMB, Galaxies, Black holes and Sterile neutrinos, Paris, France, June 2015.

“**Prospects for EoR and cosmic dawn observations with NenuFAR**”, NenuFAR: status and prospects for 21-cm observations, Paris, March 2015.

“**The cosmic history of the 21-cm line signal from the recombination epoch to the first stars**”, Chalonge Meudon Workshop 2014, From Large to Small Scale Structures in agreement with Observations: CMB, WDM, Galaxies, Black holes, Neutrinos and Sterile Neutrinos, Paris, France, May 2014.

“**Probing the Nature of Dark Matter with the First Galaxies (Reionization, 21-cm signal)**”, Debates on the Nature of Dark Matter, The Eighth Sackler Conference in Theoretical Astrophysics, Cambridge, Massachusetts, USA, May 2014.

“21-cm signal from cosmic dawn” (Review Talk), SKA-LOFAR Radio Days, Paris, France, February 2014.

“Understanding the Primordial Universe”, the Annual Conference of the Physics Department, Ecole Normale Supérieure, Paris, France, October 2013.

Contributed Conference Presentations

“Properties of the First Heating Sources from the Redshifted 21-cm Background”, *talk*, European Week of Astronomy and Space Science 2015, Tenerife, Spain, June 2015.

“Distortion of the luminosity function of high-redshift galaxies by gravitational lensing”, *talk*, European Week of Astronomy and Space Science 2015, Tenerife, Spain, June 2015.

“Probing the Early Universe with the 21cm Signal”, *talk*, The Olympian Symposium 2015 Cosmology and the Epoch of Reionization, Paralia Katerini’s, Mount Olympus, Greece, May 2015.

“Distortion of the luminosity function of high-redshift galaxies by gravitational lensing”, *poster*, Deep-15, Sintra, Portugal, March 2015.

“Probing Intergalactic Medium at the Era of Primordial Star Formation”, *talk*, Zeldovich-100 International Conference, Moscow, Russia, June 2014.

“Towards complete understanding of 21-cm signal from high redshifts”, *talk*, Transformational Science with the SKA, Stellenbosch, South Africa, February 2014.

“Prospects for cosmic dawn observations with NenuFAR”, *talk*, NenuFAR: The science with NenuFAR workshop, Paris, France, February 2014.

“Impact of Relative Motion on Large Scale Distribution of First Stars”, *talk*, Physical Bias in Cosmology, Laboratoire d’Astrophysique de Marseille, Marseille, France, May 2012.

“How Sensitive is the CMB to a Single Lens?”, *talk*, 17th International Symposium on Particles, Strings and Cosmology (PASCOS 2011), Cambridge, UK, July 2011.

“Cosmological signatures of pre-inflationary particles”, *poster*, COSMO 2009, CERN, Geneva, Switzerland, September 2009.

Conference Proceedings

L. V. E. Koopmans et al. (including **A. Fialkov**) “The Cosmic Dawn and Epoch of Reionisation with SKA”, 2015, Proceedings of Advancing Astrophysics with the Square Kilometre Array (AASKA14). 9 -13 June, 2014. Giardini Naxos, Italy

Seminars

“Constraining high-redshift Universe with 21-cm signal”, Seminar, Weizmann Institute of Science, Rehovot, Israel, June 2015.

“Constraining high-redshift heating sources with 21-cm signal”, Special Journal Club, LMU, Munich, April 2015.

“Learning about early X-ray sources from 21-cm signal”, Journal club, APC, Paris, March 2015.

“21-cm signal from early times”, seminar, IAS, Paris, March 2015.

“The nature of early X-ray sources from 21-cm signal”, Seminar, Sussex University, Brighton, February 2015.

“Other Science Cases”, *Invited contribution*, GRAND workshop, Paris, February 2015.

“The rich complexity of 21-cm fluctuations produced by the first stars”

IAS Journal Club, Princeton, November 2014,

Wine and Cheese seminar, Johns Hopkins University, Baltimore, November 2014,

Journal Club, APC, October 2014,

Journal Club, Orsay, Paris, September 2014.

“Probing the Nature of Dark Matter with First Galaxies (Reionization, 21-cm Signal)”, Seminar, ENS, Paris, September 2014.

“What 21-cm signal can tell us about high-redshift X-ray sources”, Talk, CfA, Cambridge, MA, USA, May 2014.

“Toward the Complete History of the 21-cm Signal from First Stars”, Seminar, Harvard CfA, Cambridge, MA, USA, August 2013.

“Detectable Signature of First Stars in 21-cm Signal”,

Seminar, Weizmann Institute of Science, Rehovot, Israel, April 2013,

Seminar, HUJI, Jerusalem, Israel, March 2013,

Seminar, the Technion, Haifa, Israel, February 2013,

Seminar, Scuola Normale Superiore, Pisa, Italy, November 2012,

Seminar, Kyoto University, Kyoto, Japan, November 2012,

Seminar, Institute for the Physics and Mathematics of the Universe, Tokyo, Japan, November 2012,

Seminar, Ludwig Maximilian University, Munich, Germany, November 2012,

Talk, Max-Planck-Institute fuer Astrophysik, Garching, Germany, October 2012,

Talk, Zentrum fur Astronomie, Institute of Theoretical Astrophysics at the University of Heidelberg, Heidelberg, Germany, October 2012,

Special seminar, University College London, London, UK, October 2012,

Lunch talk, Department of Applied Mathematics and Theoretical Physics, Cambridge, UK, October 2012

“Velocity and feedback enhance 21-cm signal from first stars at $z \sim 20$ ”,

Talk, University of California Irvine, Irvine, California, USA, October 2012,

Lunch talk at Astrophysical and Planetary Sciences, University of California Santa Cruz, Santa Cruz, California, USA, October 2012,

Seminar at TAPIR, California Institute of Technology, Pasadena, California, USA, October 2012,
Astrophysics seminar, University of California Santa Barbara, Santa Barbara, California, USA,
October 2012,

Talk at JHU/STScI galaxy formation journal club, Johns Hopkins University, Baltimore, Maryland, USA, September 2012,

Astro seminar, Carnegie Mellon University, Pittsburgh, Pennsylvania, USA, September 2012,

Fermilab particle astrophysics seminar, Fermilab, Chicago, Illinois, USA, September 2012,

Special seminar, Columbia, New York, New York, USA, September 2012,

Seminar, CITA, Toronto, Canada, September 2012,

“Observational Constraints on Pre-Inflationary Relics”,

Seminar at Max-Planck-Institute für Kernphysik, Heidelberg, Germany, October 2012.

Seminar at high energy group, TAU, Tel Aviv, Israel, June 2012.

“Large-Scale Fluctuations in Distribution of First Stars”, Seminar at DFMA, USP, Sao Paulo, Brazil, April 2012.

“Cosmological Imprints of Pre-Inflationary Relics”, Seminar at Special Joint Theory and Astrophysics Seminar, Department of Physics, McGill University, Montreal, Canada, August 2011.

“How Sensitive is the CMB to a Single Lens?”, School presentation at Prospects in Theoretical Physics, IAS, Princeton, New Jersey, USA, July 2011.

“Cosmological Imprints of PIP”,

Poster at Summer School in Cosmology at ICTP, Trieste, Italy, July 2010.

School presentation at Xth School of Cosmology, IESC, Cargese, France, July 2010.

Talk at Israel Physics Society, Bar-Ilan University, Ramat Gan, Israel, December 2009.

“Anomalous Large Scale Structure and the Bulk Velocity”, School presentation at Summer School at Perimeter Institute, PI, Waterloo, Canada, June 2009.

“Heavy Ion Collision”, School presentation at the Emma and Oscar Getz Summer Science Program, Weizmann Institute of Science, Rehovot, Israel, October 2003.

Participation in Scientific Schools as a Graduate Student

2015, February, “FRENCH LOFAR WORKSHOP (16-19 February 2015)”, Paris.

2013, January, “Early Galaxy Formation in LCDM cosmology”, *Talk*, IAS, HU, Jerusalem, Israel.

2012, April, “Sixth International School on Field Theory and Gravity”, LNCC, Petropolis, Brazil.

2011, July, “Frontiers of Physics in Cosmology”, *Talk*, PiTP, IAS, Princeton, New Jersey, USA.

2010, July, Summer School in Cosmology, *Poster*, ICTP, Trieste, Italy.

2010, July, Xth School of Cosmology, *Talk*, IESC, Cargese, France.

2009, June, “Exploring the Cosmological Frontiers”, *Talk*, PI, Waterloo, Canada.

2009, January, “Particle Physics in the Age of the LHC”, IAS, HU, Jerusalem, Israel.

2007, April, “String Theory - from Theory to Experiment”, IAS, HU, Jerusalem, Israel.

Publications

Total of 16 papers, 12 first author

1. **“Constraining the redshifted 21-cm signal with unresolved soft X-ray background”**
A. Fialkov, A. Cohen, R. Barkana & J. Silk
in preparation
Num. of citations at NASA ADS:
2. **“Precise Measurement of the Reionization Optical Depth from Global 21-cm Signal with Realistic Heating”**
A. Fialkov & A. Loeb
Submitted to ApJ, arXiv:1601:03058
Num. of citations at NASA ADS: 0
3. **“The 21-cm BAO signature of enriched low-mass galaxies during cosmic reionization”**
A. Cohen, A. Fialkov & R. Barkana
Submitted to MNRAS, arXiv:1508.04138.
Num. of citations at NASA ADS: 3
4. **“HERMES: SPATIALLY RESOLVED ALMA IMAGING OF HERSCHELy-SELECTED DUSTY STAR-FORMING GALAXIES”**
R. S. Bussmann, D. Riechers, A. Fialkov, et al.,
ApJ, 812 (2015) 43,
Num. of citations at NASA ADS: 4
5. **“Distortion of the luminosity function of high-redshift galaxies by gravitational lensing”**
A. Fialkov, & A. Loeb
ApJ, 806 (2015), 256,
Num. of citations at NASA ADS: 7
6. **“Reconstructing the nature of the first cosmic sources from the anisotropic 21-cm signal”**
A. Fialkov, R. Barkana & A. Cohen
PRL, 114 (2015) 1303,
Num. of citations at NASA ADS: 6
7. **“The rich complexity of 21-cm fluctuations produced by the first stars”**
A. Fialkov & R. Barkana
MNRAS, 445 (2014) 213, arXiv:1409.3992.
Num. of citations at NASA ADS: 7
8. **“Supersonic relative velocity between dark matter and baryons: A review”**
A. Fialkov,
IJMPD, 23 (2014) 8,
Invited Review,
Num. of citations at NASA ADS: 13.
9. **“The observable signature of late heating of the Universe during cosmic reionization”**
A. Fialkov, R. Barkana & E. Visbal

Nature, 506 (2014) 197,
Num. of citations at NASA ADS: 34.

10. **“Complete history of the observable 21 cm signal from the first stars during the pre-reionization era”**
A. Fialkov, R. Barkana, A. Pinhas & E. Visbal
MNRAS, 437 (2014) 36,
Num. of citations at NASA ADS: 12.
11. **“The 21-cm Signal from the Cosmological Epoch of Recombination”**
A. Fialkov & A. Loeb
JCAP, 11 (2013) 066,
Num. of citations at NASA ADS: 5.
12. **“The 21-cm signature of the first stars during the Lyman-Werner feedback era”**
A. Fialkov, R. Barkana, E. Visbal, D. Tseliakhovich & C. M. Hirata
MNRAS, 432 (2013) 2909,
Num. of citations at NASA ADS: 26.
13. **“Impact of the Relative Motion between Dark Matter and Baryons on the First Stars”**
A. Fialkov, R. Barkana, D. Tseliakhovich & C. M. Hirata
MNRAS, 424 (2012) 1335,
Num. of citations at NASA ADS: 45.
14. **“The signature of the first stars in atomic hydrogen at redshift 20”**
E. Visbal, R. Barkana, A. Fialkov, D. Tseliakhovich & C. M. Hirata
Nature, 487 (2012) 70,
Num. of citations at NASA ADS: 37.
15. **“How Sensitive is the CMB to a Single Lens?”**
B. Rathaus, A. Fialkov and N. Itzhaki
JCAP, 6 (2011) 33,
Num. of citations at NASA ADS: 5.
16. **“Cosmological Imprints of Pre-Inflationary Particles”**
A. Fialkov, N. Itzhaki and E. D. Kovetz
JCAP, 2 (2010) 4,
Num. of citations at NASA ADS: 18.