Alex B. Nielsen

Citizenship:	Denmark
Work Address:	Department of Mathematics and Physics, University of Stavanger NO-4036, Stavanger, Norway
e-mail:	alex.b.nielsen@uis.no
Telephone:	+47-5183-1086
Personal webpage:	https://www.atlas.aei.uni-hannover.de/~alex.nielsen/

Employment

2019-present	Associate Professor, University of Stavanger, Stavanger, Norway
2015-2019	Senior scientist, Max Planck Institute (AEI), Hanover, Germany
2011-2015	Junior scientist, Max Planck Institute (AEI), Hanover, Germany
2009-2011	Humboldt post-doctoral fellow, Max Planck Institute (AEI), Potsdam, Germany
2007-2009	Post-doctoral fellow, Center for Theoretical Physics, Seoul National University, Seoul, Korea
2003-2004	Graduate assistant to Dr. David Wiltshire, Christchurch, New Zealand
2000-2002	Financial analyst, Morgan Stanley Dean Witter, London, United Kingdom

Education

2004-2007	**Ph.D. in Theoretical Physics** Date of award: 27 April 2007
1998-1999	**M.Sc.** Quantum Fields and Fundamental Forces, Imperial College, United Kingdom
1997-1998	4th year graduate courses in theoretical physics University of Copenhagen, Copenhagen, Denmark
1994-1997	**B.Sc.** Physics with Theoretical Physics, Imperial College, London, United Kingdom

Research interests

Gravitational wave observations
Astrophysical properties of black holes and neuton stars
Tests of general relativity and alternative black hole models
Hawking radiation and black hole thermodynamics
Local and quasi-local properties of cosmological and black hole horizons

Alex Nielsen

Publications List

131 total publications
76 as part of the LIGO Scientific Collaboration
3 review articles
37,786 citations (INSPIRE 21 November 2022)
h-index 52

LIGO Collaboration papers with significant contribution

Abbott et al.
"Tests of General Relativity with the Binary Black Hole Signals from the LIGO-Virgo Catalog GWTC-1"
Phys.Rev.D 100 (2019) 10, 104036

Abbott et al.
"GW170814: A three-detector observation of gravitational waves from a binary black hole coalescence"
Phys.Rev.Lett. 119 (2017) no.14, 141101

Abbott et al.
"Search for intermediate mass black hole binaries in the first observing run of Advanced LIGO"
Physical Review D 96, 022001 (2017)

Abbott et al.
"The basic physics of the binary black hole merger GW150914"
Annalen Phys. 529 (2016) 1600209

Abbott et al.
"Upper limits on the rates of binary neutron star-black hole mergers from Advanced LIGO's first observing run"
ApJ 832 (2016) L21

Abbott et al.
"Binary Black Hole Mergers in the first Advanced LIGO Observing Run"
Physical Review X6 (2016) 041015

Abbott et al.
"GW151226: Observation of Gravitational Waves from a 22-Solar-Mass Binary Black Hole Coalescence"
Physical Review Letters 116 (2016) 241103

Abbott et al.
"GW150914: First results from the search for binary black hole coalescence with Advanced LIGO" Physical Review D93 (2016) 122003

Abbott et al.
"Tests of general relativity with GW150914"

Physical Review Letters 116 (2016) 221101

Abbott et al.
"Observation of Gravitational Waves from a Binary Black Hole Merger"
Physical Review Letters 116 (2016) 061102

Plus 66 other collaboration papers not listed since 2014.

Other research articles

Shilpa Kastha, Collin D. Capano, Julian Westerweck, Miriam Cabero, Badri Krishnan and **Alex B. Nielsen**
"Model systematics in time domain tests of binary black hole evolution"
Phys.Rev.D 105 (2022) 6, 064042

Paolo Marcoccia, Felicia Fredriksson, Alex B. Nielsen and Germano Nardini
"Pearson cross-correlation in the first four black hole binary mergers"
JCAP 11 (2020) 043

B. Edelman, F.J. Rivera-Paleo, J.D. Merritt, B. Farr,,Z. Doctor,J. Brink, W. M. Farr, J. Gair, J. Shapiro Key, J. McIver, **Alex B. Nielsen**
"Constraining unmodeled physics with compact binary mergers from GWTC-1"
Published in: Phys.Rev.D 103 (2021) 4, 042004

Alex B. Nielsen, A.H. Nitz, C.D. Capano and D. A. Brown
"Investigating the noise residuals around the gravitational wave event GW150914"
Journal of Cosmology and Astroparticle Physics 1902 (2019) 019

Miriam Cabero, Julian Westerweck, Collin D. Capano, Sumit Kumar, **Alex B. Nielsen** and Badri Krishnan
"Black hole spectroscopy in the next decade"
Phys.Rev.D 101 (2020) 6, 064044

Alexander H. Nitz, **Alex B. Nielsen**, Collin D. Capano
"Potential Gravitational-wave and Gamma-ray Multi-messenger Candidate from 2015 October 30"
Astrophys.J.Lett. 876 (2019) 1, L4

A.H. Nitz, C, Capano, **Alex B. Nielsen**, S. Reyes, R. White D. A. Brown and B. Krishnan
"1-OGC: The first open gravitational-wave catalog of binary mergers from analysis of public Advanced LIGO data"
Astrophysics Journal 872 (2019) 195

Alex B. Nielsen and Andrey A. Shoom
"Conformal Killing horizons and their thermodynamics"
Classical and Quantum Gravity 35 (2018) 105008

Nathaniel Indik, Henning Fehrmann, Franz Harke, Badri Krishnan and **Alex B. Nielsen**,

Alex Nielsen

“Reducing the number of templates for aligned-spin compact binary coalescence gravitational wave searches using metric-agnostic template nudging,"
Physical Review D 97 (2018) 124008

Alex B. Nielsen and Ofek Birnholz
“Testing pseudo-complex general relativity with gravitational waves”
Astronomische Nachrichten 339 (2018) 298

Ashton et al.,
“Coincident detection significance in multimessenger astronomy,"
Astrophysics Journal 860 (2018) 6

Gupta, Krishnan, **Nielsen**, Schnetter
“Dynamics of marginally trapped surfaces in a binary black hole merger: Growth and approach to equilibrium”
Physical Review D 97 (2018) 084028

Westerweck, **Nielsen**, Fischer-Birnholtz, Cabero, Capano, Dent, Krishnan, Meadors, Nitz
“Low significance of evidence for black hole echoes in gravitational wave data”
Phys.Rev. D97 (2018) no.12, 124037

Cabero, Capano, Fischer-Birnholtz, Krishnan, **Nielsen**, Nitz
“Observational tests of the black hole area increase law”
Physical Review D 97 (2018) 124069

Ghosh, Johnson-McDaniel, Ghosh, Mishra, Ajith, Del Pozzo, Berry, **Nielsen** and London
“Testing general relativity using gravitational wave signals from the inspiral, merger and ringdown of binary black holes”
Classical and Quantum Gravity, 35 (2018) 014002

Nathaniel Indik, K. Haris, Tito Dal Canton, Henning Fehrmann, Badri Krishnan, Andrew Lundgren, **Alex B. Nielsen**, and Archana Pai
“A stochastic template bank for gravitational wave searches for precessing neutron star - black hole coalescence events”
Physical Review D 95, 064056 (2017) [arXiv:1612.05173]

Miriam Cabero, **Alex B. Nielsen**, Andrew Lundgren and Collin Capano
“Minimum energy and the end of inspiral in the post-Newtonian approximation”
Physical Review D 95, 064016 (2017) [arXiv: 1602.03134]

Messick et al.
“Analysis Framework for the Prompt Discovery of Compact Binary Mergers in Gravitational-wave Data”
Phys.Rev. D 95 (2017) no.4, 042001

Usman et al.
“The PyCBC search for gravitational waves from compact binary coalescence”
Classical and Quantum Gravity 33 (2016) 215004

Paik, Griggs, Vol Moody, Venkateswara, Lee, **Nielsen**, Majorana, Harms
"Low-frequency terrestrial tensor gravitational-wave detector"
Classical and Quantum Gravity, 33 (2016) 075003

Ghosh, Ghosh, Johnson-McDaniel, Chandra, Parameswaran, Del Pozzo, Nichols, Chen, **Nielsen**, Berry, London
"Testing general relativity using golden black-hole binaries"
Physical Review D 94 (2016) 021101

Tito Dal Canton, Andrew Lundgren and **Alex B. Nielsen**
"Impact of precession on aligned-spin searches for neutron-star-black-hole binaries",
Physical Review D 91, 062010 (2015), [arXiv:1411.6815]

Tito Dal Canton, Alex Nitz, Andrew Lundgren, **Alex B. Nielsen** *et al.*
"Implementing a search for aligned-spin neutron star-black hole systems with advanced ground based gravitational wave detectors."
Physical Review D 90, 082004 (2014), [arXiv: 1405.6731]

Alex B. Nielsen
"RevisitingVaidya horizons"
Galaxies, 2(1), 62 (2014)

Madeline Wade, Jolien Creighton, Evan Ochsner and **Alex B. Nielsen**
"Advanced LIGO's ability to detect apparent violations of the cosmic censorship conjecture and the no-hair theorem through compact binary coalescence detections"
Physical Review D 88, 083002 (2013), [arXiv:1306.3901]

Frank Ohme, **Alex B. Nielsen**, Drew Keppel and Andrew Lundgren
"Statistical and systematic errors for gravitational wave inspirals signals:
A principal component analysis"
Physical Review D 88, 042002 (2013), [arXiv:1304.7017]

Alex B. Nielsen
"Compact binary coalescence parameter estimations
for 2.5 post-Newtonian aligned spinning waveforms"
Classical and Quantum Gravity 30, 075023 (2013), [arXiv:1203.6603]

Alex B. Nielsen and J.T. Firouzjaee
"Conformally rescaled spacetime and Hawking radiation"
General Relativity and Gravitation 45, 1815 (2013) [arxiv:1207.0064]

Valerio Faraoni and **Alex B. Nielsen,**
"The horizon-entropy increase law for causal and quasi-local horizons
and conformal field redefinitions"
Classical and Quantum Gravity 28, 175008 (2011), [arXiv:1103.2089]

Mathias Pielahn, Gabor Kunstatter and **Alex B. Nielsen,**
"Dynamical surface gravity in spherically
symmetric black hole formation"

Physical Review D 84, 175008 (2011), [arXiv:1103.0750]

Alex B. Nielsen, Michael Jasiulek, Badri Krishnan and Erik Schnetter
"The slicing dependence of non-spherically symmetric
quasi-local horizons in Vaidya Spacetimes"
Physical Review D 83, 124022 (2011), [arxiv:1007.2990]

Alex B. Nielsen
"The spatial relation between the event horizon and trapping horizon"
Classical and Quantum Gravity 27, 245016 (2010), [arXiv:1006.2448]

Alex B. Nielsen and Dong-han Yeom
"Spherically symmetric trapping horizons,
the Misner-Sharp mass and black hole evaporation"
International Journal of Modern Physics A24, 5261 (2009), [arXiv:0804.4435]

Alex B. Nielsen
"Black Holes without Event Horizons"
Journal of the Korean Physical Society 54, 2576 (2009), [arXiv:0802.3422]

Alex B. Nielsen and Jong Hyuk Yoon
"Dynamical surface gravity"
Classical and Quantum Gravity 25:085010 (2008), [arxiv:0711.1445]

Ben M. Leith and **Alex B. Nielsen**
"Non-minimally coupled multi-scalar black holes"
Physical Review D 76, 124024 (2007), [arxiv:0709.2541]

D.V. Ahluwalia-Khalilova, N.G. Gresnigt, **Alex B. Nielsen**, D. Schritt and T.F. Watson
"Possible polarisation and spin dependent aspects of quantum gravity"
International Journal Modern Physics D17, 495-504 (2008), [arxiv:0704.1669]

D.V. Ahluwalia-Khalilova and **Alex B. Nielsen**
"MiniBooNE and a (CP)^2=-1 sterile neutrino"
Modern Physics Letters A 22, 1301-1307 (2007) [hep-ph/0702049]

Alex B. Nielsen,
"Skyrme Black Holes in the Isolated Horizons Formalism",
Physical Review D 74, 044038 (2006) [gr-qc/0603127]

Alex B. Nielsen and Matt Visser
"Production and Decay of Evolving Horizons",
Classical and Quantum Gravity 23, 4637-4658 (2006) [gr-qc/0510083]

Benedict M. N. Carter, **Alex B. Nielsen** and David L. Wiltshire
"Hybrid braneworlds in the Salam-Sezgin model",
Journal of High Energy Physics 0607, 034 (2006) [hep-th/0602086]

Benedict M. N. Carter and **Alex B. Nielsen**

"Series solutions for a static scalar potential in a Salam-Sezgin Supergravitational hybrid braneworld",
General Relativity and Gravitation, 37, 1629-1634 (2005) [gr-qc/0512024]

Review Articles

A. Addazi et al (162 authors
"Quantum gravity phenomenology at the dawn of the multi-messenger era—A review"
Prog.Part.Nucl.Phys. 125 (2022) 103948

Alex B. Nielsen
"Black holes and black hole thermodynamics without event horizons"
Editor-invited review, General Relativity and Gravitation 41, 1539 (2009)
[arXiv:0809.3850]

Alex B. Nielsen
"Black holes without boundaries"
Editor-invited review International Journal of Modern Physics D 17,
2359-2366, (2009), [arXiv:0809.1711]

Pre-prints, Conference Proceedings and Book Chapters

C. D. Capano, J. Abedi, S. Kastha, A. H. Nitz, J. Westerweck, Y.-F. Wang, M. Cabero, **Alex B. Nielsen**, B. Krishnan
"Statistical validation of the detection of a sub-dominant quasi-normal mode in GW190521"
e-Print: 2209.00640

C. D. Capano, M. Cabero, J. Westerweck, J. Abedi, S. Kastha, A. H. Nitz, Y.-F. Wang, **Alex B. Nielsen**, B. Krishnan
"Observation of a multimode quasi-normal spectrum from a perturbed black hole"
e-Print: 2105.05238 [gr-qc]

A. A. Shoom, P. K. Gupta, B. Krishnan, **Alex B. Nielsen**, C. D. Capano
"Testing GR with the Gravitational Wave Inspiral Signal GW170817"
e-Print: 2105.02191 [gr-qc]

Alex B. Nielsen
"On the distribution of stellar-sized black hole spins"
J.Phys.Conf.Ser 716 (2016) 012002

Alex B. Nielsen
"Physical aspects of quasi-local black hole horizons"
Int.J.Mod.Phys.Conf.Ser. 07 (2012) 67
2011 Asia Pacific School/Workshop on Cosmology and Gravitation

Feb 2011, Shanghai, China

Alex B. Nielsen
"Black holes: New Horizons", World Scientific, 2013 Singapore (book chapter)

Alex B. Nielsen
"Horizon-entropy increase laws for spherically
symmetric horizons in Brans-Dicke theory"
J.Phys.Conf.Ser. 314, 012094 (2011)
Spanish Relativity Meeting ERE 2010, Sep. 2010 Granada, Spain.

Alex B. Nielsen
"Black holes as local horizons"
Talk at KPS meeting Oct. 2007 Jeju, Korea
[arxiv:0711.0313]

Benedict M.N. Carter, Ben M. Leith, S.C. Cindy Ng, **Alex B. Nielsen**
and David L. Wiltshire
"Type 1a Tests of Fractal Bubble Universe with no Cosmic Acceleration",
[astro-ph/0504192]

Doctoral Thesis

Black Hole Horizons and Black Hole Thermodynamics (April 2007)
University of Canterbury, available online or in paper format on request.