

Address: Callinstraße 38 Hannover, Germany 30167 Born: 12 January 1991, India	Avneet Singh	avneet.singh@aei.mpg.de url: https://bit.ly/2JGvNGg Phone : +49 (0)176 8339 0355 +47 968 10 590
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*all lists in reverse chronological order | links to superscripts at the end

Education:

	Institute	Year
PhD <i>(magna cum laude)</i> Astrophysical & Cosmological Relativity	IMPRS, Max-Planck-Institut für Gravitationsphysik <i>Albert Einstein Institute – Potsdam-Golm & Hannover</i> <i>Gottfried Wilhelm Leibniz Universität Hannover</i>	2014 – 17
M.Sc <i>(cum laude)</i> Astrophysics & Astronomy	Erasmus+ program for Astrophysics & Astronomy <i>University of Padova, University of Innsbruck &</i> <i>University of Rome Tor Vergata</i>	2012 – 14
B.Tech Applied Physics	Indian Institute of Technology (I.I.T.) <i>Guwahati, India</i>	2008 – 12

Academic collaborations:

2014–18 Member of the LIGO Scientific Collaboration (LSC) and the LIGO–Virgo Consortium
Current Member of the Max Planck Society (Max-Planck-Gesellschaft)
Einstein@Home project

Current Research:

- **Postdoctoral Research Fellow (2020–)**
Einstein@Home, Albert-Einstein-Institut Hannover
 - a) Modeling and searching for non-standard continuous gravitational wave (CW) emission from neutron stars.
 - b) Chaos in gravitationally bound systems.

Previous Research Positions:

- **Postdoctoral Research Fellow (2017–2018)**
Einstein@Home, Albert-Einstein-Institut Hannover
Modeled continuous gravitational wave (CW) emission from neutron stars and designed data-analysis pipelines and algorithms for the *Einstein@Home* volunteer-distributed computing project in searches for CW.
- **Data Assimilation in Strongly Coupled Earth Systems (2019–2020)**
The Geophysical Institute, BCCR, NERSC, University of Bergen
Worked on formulating new methods that optimise cross-covariance updates in Strongly Coupled Data Assimilation (SCDA) in order to improve climate prediction capabilities, especially when climate model subcomponents evolve on differing time-scales.

Research in the past:

- **Neutron stars and continuous gravitational waves (2014–17)**
Albert-Einstein-Institut Hannover
Designed new post-processing methods for continuous gravitational wave searches in LIGO S5, S6 and O1 data on the Einstein@Home volunteer distributed computing network. Independent research work included analytical modeling of continuous gravitational wave emission from superfluid quasinormal modes driven by neutron star glitches.
- **Non-Gaussianity in scalar-tensor Hybrid Inflation (2013–14)**
INFN Padova
Estimated the primordial non-Gaussianity and non-linearity in Horndeski models of Inflation; extended previous works on higher-order power spectra, and calculated the bi-spectrum of the primordial quantum fluctuations using Weinberg's in-in formalism and

scattering amplitudes.

- Research Intern at the Max-Planck Institute for Gravitational Physics at Hannover (2011) in *Quantum Optics*
- Research Intern at the CGWA – University of Texas Brownsville (2010) in *Quantum Optics*

Conference/Colloquium talks:

*invited talks in †bold

- †Data analysis methods in gravitational wave searches
Niels-Bohr-Institut, Copenhagen, 2017
- †Instrumentation and astrophysics in gravitational wave astronomy
Niels-Bohr-Institut, Copenhagen, 2017
- †Neutron stars: sources and searches
IUCAA, Pune, 2017
- Neutron stars and continuous gravitational waves
GenerationGW, US Virgin Islands, 2017
- In search for continuous wave transients: toward neutron star equation-of-state
GR-XXI, New York, 2016
- Einstein@Home all-sky continuous gravitational wave searches in LIGO1 data
GWPAW-XX, Cape Cod, 2016
- †GW150914: In the era of gravitational wave astronomy
IIT, Guwahati, 2016
- High-frequency all-sky continuous gravitational wave search in LIGO1-S5 data
LVC, Pasadena, 2016
- Continuous wave transients from glitching neutron stars via Ekman pumping
AMALDI-XI, Gwangju & GWPAW-XIX, Osaka & LVC, Pasadena, 2015

Public talks:

*invited talks in †bold

- Cosmos: Gravitation & Cosmology
Die Nacht Die Wissenschaft, Hannover, 2016
- †Gravitational waves & the binary black hole merger GW150914
IIT, Guwahati, 2016
- †Gravity & the Universe
St.-Dominikus-Gymnasium, Karlsruhe, 2016

Publications:

Search for Continuous Gravitational Waves from the Central Compact Objects in Supernova Remnants Cassiopeia A, Vela Jr. and G347.3-0.5
M A Papa, J Ming, E Gotthelf, B Allen, R Prix, V Dergachev, H-B Eggenstein, A Singh, S J Zhu
The Astrophysical Journal, 897, 1 (2020) ([arXiv](#))

Detection and Timing of Gamma-ray Pulsations from the 707-Hz Pulsar J0952-0607
L Nieder, C J Clark, C G Bassa, J Wu, A Singh et al
Astrophysical Journal Letters, 883, 1 (2019) ([arXiv](#))

Characterizing the sensitivity of isolated continuous gravitational wave searches to binary orbits
Avneet Singh, Maria Alessandra Papa, Vladimir Dergachev
Physical Review D, 100, 024058 (2019) ([arXiv](#))

Results from an Einstein@Home search for continuous gravitational waves from Vela Jr, Cassiopeia A and G347.3
Jing Ming, Maria Alessandra Papa, Avneet Singh et al
Physical Review D, 100, 024063 (2019) ([arXiv](#))

Gravitational wave transient signal emission via Ekman pumping in neutron stars during post-glitch relaxation phase
Avneet Singh
Physical Review D, 95, 024022 (2017) ([arXiv](#))

Results of an all-sky high-frequency Einstein@Home search for continuous gravitational waves in LIGO's fifth science run
Avneet Singh, Maria Alessandra Papa, Heinz-Bernd Eggenstein, Sylvia Zhu et al
Physical Review D, 94, 064061 (2016) ([arXiv](#))

Adaptive clustering procedure for continuous gravitational wave searches
Avneet Singh, Maria Alessandra Papa, Heinz-Bernd Eggenstein, Sinéad Walsh
Physical Review D, 96, 082003 (2017) ([arXiv](#))

Improved post-processing in searches for continuous gravitational waves and a model for transient continuous gravitational wave emission from neutron star glitches
Avneet Singh
Gottfried Wilhelm Leibniz Universität, Diss., 2017, 140 S (2017)
(DOI: <https://doi.org/10.15488/3426>)

First low-frequency Einstein@Home all-sky search for continuous gravitational waves in advanced LIGO data
LIGO Scientific Collaboration & the Virgo Collaboration
Physical Review D, 96, 122004 (2017) ([arXiv](#))

Results of the deepest all-sky survey for continuous gravitational waves on LIGO S6 data running on the Einstein@Home volunteer distributed computing project
LIGO Scientific Collaboration & the Virgo Collaboration
Physical Review D, 94, 102002 (2016) ([arXiv](#))

Hierarchical follow-up of sub-threshold candidates of an all-sky Einstein@Home search for continuous gravitational waves on LIGO sixth science run data
Maria Alessandra Papa, Heinz-Bernd Eggenstein, Sinéad Walsh, Avneet Singh, Sylvia J. Zhu et al
Physical Review D, 94, 122006 (2016) ([arXiv](#))

Primordial non-Gaussianity in Horndeski-type model for Inflation
Avneet Singh
arXiv (2014, 2017) ([arXiv](#))

Joint publications under LSC/LVC collaboration available here: <https://goo.gl/YNQXuP>
Google Scholar: <https://goo.gl/GhRDmP>

Technical Expertise:

- **Programming Languages:** Python, Unix/Linux Shell, HTCondor, MatLab, C/C++, Mathematica, R
- **Software Packages:** Latex, InkScape, Gimp, AnSys, LabVIEW, Simulink

Teaching Experience:

- **University Teaching (2017)**
Lead Instructor for the Data Analysis and Cluster Computing Laboratory G9-137
Leibniz Universität Hannover & Albert-Einstein-Institute
- **High School Lecturership (2009-2010)**
Lecturer of Organic Chemistry and Physics
Concept Eduventures Guwahati

Non-technical academia & Outreach:

- **Model United Nations (MUN) conferences:**

Journalist for the BIMUN Tribune at *Bonn International Model United Nations '15*
Judge in the International Court of Justice at *Hamburg Model United Nations '15*
Judge & President of the International Court of Justice at *KU Leuven Model United Nations '16*
Journalist at the *Heidelberg Model United Nations '16*
Editor-in-chief of the BerlinMUN News Agency at the *Berlin International Model United Nations '16*
Editor-in-chief of the BIMUN Tribune at the *Bonn International Model United Nations '16*
- **Member of the LIGO-Virgo Education and Public Outreach**

Led the reddit [/r/IAMa/](#) on the first multi-messenger binary neutron star detection (GW170817)¹. The [/r/IAMa/](#) featured a panel of 47 scientists from 15+ astronomical observatories, space telescopes and missions such as the Hubble, Chandra, LISA Pathfinder, Swift, LIGO Hanford, LIGO Livingston etc.

Served on the panel of LIGO scientists for reddit [/r/IAMa/](#) on the Nobel prize winning first observation of binary black holes and the first direct observation of gravitational waves (GW150914)².

Recognitions & Awards:

- Shared several awards with the LIGO Scientific Collaboration such as the \$3m Special Breakthrough Prize in Fundamental Physics, Princess of Asturias Award, Rossi Prize etc
- Cited in the merit list of top 1% in the IIT Joint Entrance Examination (IIT-JEE)