



Curriculum Vitae Prof. Dr. Alessandra Buonanno



Image: A. Klaer

Name: Alessandra Buonanno

Research Priorities: Theoretical gravitational physics, gravitational-wave astronomy

Alessandra Buonanno is an Italian-American physicist. She is a leading theorist in the field of gravitational-wave physics, and a Principal Investigator of the LIGO Scientific Collaboration. She is known for her work on waveform modelling, which has been essential for the detection of gravitational waves from binary systems composed of black holes and neutron stars, and the astrophysical interpretation of the signals.

Academic and Professional Career

- since 2020 Research Professor, Department of Physics, University of Maryland, College Park, USA
- since 2017 Honorary Professor of Physics, Humboldt-Universität zu Berlin and University of Potsdam, Germany
- since 2014 Director, Max Planck Institute for Gravitational Physics, Potsdam, Germany
- 2014 - 2020 College Park Professor, Department of Physics, University of Maryland, College Park, USA
- 2010 - 2014 Professor, Department of Physics, University of Maryland, College Park, USA
- 2005 - 2014 Visiting Associate, Caltech – California Institute of Technology, Pasadena, USA
- 2005 - 2010 Associate Professor (tenured), Department of Physics, University of Maryland, College Park, USA
- 2002 Visiting Associate, Caltech – California Institute of Technology, Pasadena, USA

- 2005 - 2012 Chargée de Recherche de 1ere classe (tenured), Centre national de la recherche scientifique (CNRS) (on leave of absence), Laboratoire d'Astroparticule et Cosmologie (APC), Paris, France
- 2005 Chargée de Recherche de 1ere classe (tenured), CNRS, Laboratoire d'Astroparticule et Cosmologie (APC), Paris, France
- 2001 - 2004 Chargée de Recherche de 1ere classe (tenured), CNRS, Institut d'Astrophysique de Paris (IAP), Paris, France
- 1999 - 2001 Richard C. Tolman Prize Postdoctoral Fellow, Caltech – California Institute of Technology, Pasadena, USA
- 1997 - 1999 Postdoctoral Researcher, Institut des Hautes Études Scientifiques (IHES), Bures-sur-Yvette, France
- 1997 Research Associate, CERN – European Organization for Nuclear Research, Geneva, Switzerland
- 1993 - 1996 PhD in Physics, University of Pisa, Pisa, Italy
- 1993 Masters degree in Physics (Laurea), University of Pisa, Pisa, Italy

Functions in Scientific Societies and Committees

- since 2022 Member, Committee, Aspen Institute Italia Award for Scientific Research and Collaboration between Italy and the United States, Aspen Institute Italia, Italy
- 2019 - 2021 Member, Senior Committee, Voyage 2050, European Space Agency (ESA)
- since 2019 Member, Kavli Prize Committee in Astrophysics, Norwegian Academy of Science and Letters, Norway
- since 2019 Member, Scientific Advisory Board, Institut d'Astrophysique de Paris, Sorbonne University, CRNS, Paris, France
- since 2018 Member, Scientific Advisory Board, Walter Burke Institute for Theoretical Physics, Caltech – California Institute of Technology, Pasadena, USA
- since 2014 Scientific Member, Max Planck Society, Germany

Project Coordination, Membership in Collaborative Research Projects

- since 2005 Principal Investigator, LIGO Scientific Collaboration (LSC)
- since 2018 Member, Board, Laser Interferometer Space Antenna (LISA) Consortium

Honours and Awarded Memberships

2021	Balzan Prize (together with Thibault Damour), International Balzan Prize Foundation, Milan, Italy
2021	Dirac Medal and Prize (together with Thibault Damour, Frans Pretorius and Saul Teukolsky), Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
since 2021	Elected Member, National Academy of Sciences, USA
2021	Galileo-Galilei Medal (together with Thibault Damour and Frans Pretorius), National Institute for Nuclear Physics (INFN), Rome, Italy
since 2021	Member, German National Academy of Sciences Leopoldina
since 2021	Member, Berlin-Brandenburg Academy of Sciences and Humanities, Germany
2019	8th Benjamin Lee Professorship, Asian Pacific Center for Theoretical Physics, South Korea
2018	Gottfried Wilhelm Leibniz Prize, German Research Foundation (DFG)
2016	Lower Saxony State Prize (together with Bruce Allen and Karsten Danzmann), Federal State of Lower Saxony, Germany
2014 - 2020	Distinguished Visiting Research Chair, Perimeter Institute for Theoretical Physics, Waterloo, Canada
2011–2012	William and Flora Hewlett Fellow, Radcliffe Institute for Advanced Study, Harvard University, Cambridge, USA
since 2011	Elected Fellow, American Physical Society (APS), USA
since 2010	Elected Fellow, International Society of General Relativity and Gravitation (ISGRG)
2006 - 2008	Sloan Research Fellowship, Alfred P. Sloan Foundation, New York City, USA
2000	Italian Society of General Relativity and Gravitational Physics Prize, Italian Society of General Relativity and Gravitational Physics (SIGRAV), Italy

Research Priorities

Alessandra Buonanno is an Italian-American physicist. She is a leading theorist in the field of gravitational-wave physics and a Principal Investigator of the LIGO Scientific Collaboration. She is known for her work on waveform modelling, which has been essential for the detection of gravitational waves from binary systems composed of black holes and neutron stars, and the astrophysical interpretation of the signals.

Alessandra Buonanno's research focuses on the theoretical predictions of gravitational waves emitted by binary systems composed of compact objects, such as black holes and neutron stars. To

achieve highly accurate waveform models, she co-developed a novel approach to study the two-body problem in general relativity, namely the effective one-body (EOB) formalism. This approach made the first analytical prediction of the gravitational wave signal from two coalescing black holes. Alessandra Buonanno and her research group pioneered and greatly contributed to the successful synergistic approach of combining numerical-relativity techniques with analytical-relativity methods, with the goal of developing the most accurate and efficient waveform models for gravitational-wave observations. These models are routinely employed by her research group and the LIGO Scientific Collaboration and Virgo Collaboration to infer astrophysical, cosmological and gravitational properties.

Alessandra Buonanno has also pioneered studies in quantum-optical noise and high-precision measurements for gravitational-wave detectors. She co-discovered that quantum correlations between photon shot noise and radiation-pressure noise (notably the optical-spring effect) can circumvent constraints imposed by the Heisenberg uncertainty principle in LIGO and Virgo detectors. She is especially interested in using gravitational-wave observations to unveil fundamental physics information and probe the nature of black holes and gravity in the high-velocity, strong-field regime.