

# The Cosmic Enigma: Cosmology & Particle Astrophysics

## Biographies of the Participating Scientists



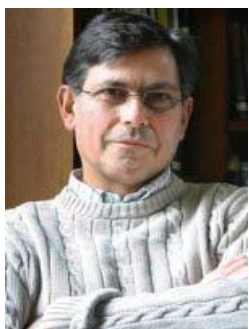
**Professor Tal Alexander**  
Weizmann Institute of Science

Professor Alexander received his PhD from Tel Aviv University in 1998, and joined the Weizmann Institute in 2001. He is a theoretical astrophysicist working on massive black holes, stellar dynamics in galactic nuclei and stellar phenomena in the vicinity of massive black holes, gravitational wave sources and the Galactic Center. He was awarded the Wolf Foundation Krill Prize for Excellence in Scientific Research in 2007.



**Professor Jonathan Butterworth**  
University College London

Professor Butterworth's first research interests focused on the ZEUS experiment at the Hadron Electron Ring Anlage (HERA) in DESY, Hamburg. He was an author of a key simulation program which is now used at the CERN Large Hadron Collider (LHC). He has also worked on building part of a new vertex detector for ZEUS. His research is now centred on the ATLAS experiment at the LHC. As well as contributing to the tracking, trigger and software, Professor Butterworth leads a UCL group studying several physics processes at the LHC which will help us discover more about electroweak symmetry breaking. This includes searching for the infamous standard model Higgs particle.



**Professor George Efstathiou FRS**  
University of Cambridge

Professor Efstathiou holds the Professor of Astrophysics (1909) at the University of Cambridge. He received his BA in Physics from Keble College, Oxford University in 1976, and his PhD in Astronomy from Durham University in 1979. In 1988, Professor Efstathiou was appointed to the Savilian Chair of Astronomy at Oxford University, where he served as Head of Astrophysics until 1994. He returned to Cambridge in 1997 and served as Head of Department at the Institute of Astronomy in 2004 until 2008 when he then undertook his current position as Director of the Kavli Institute for Cosmology. Professor Efstathiou has received several prizes for his research including the 1990 Maxwell Medal and Prize of the Institute of Physics. He was elected to the Royal Society in 1994. Professor Efstathiou has wide interests in theoretical and observational cosmology and has contributed to studies of large-scale structure in the universe, galaxy formation, dark energy and the cosmic microwave background radiation.



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**Professor Andy Fabian FRS**  
University of Cambridge

Professor Fabian is a Royal Society Research Professor at the Institute of Astronomy, Cambridge, and Vice-Master of Darwin College, Cambridge. He is one of the field's foremost high-energy astrophysicists and the President of the Royal Astronomical Society. His current areas of research include galaxy clusters, active galactic nuclei, strong gravity, black holes and the X-ray background. He has also worked on X-ray binaries, neutron stars and supernova remnants in the past. He was awarded the Dannie Heinemann Prize for Astrophysics by the American Astronomical Society in 2008.



**Dr Avishay Gal-Yam**  
Weizmann Institute of Science

Dr Gal-Yam is an astrophysicist who investigates the origins and underlying physical processes of two types of stellar explosions, supernovae and gamma-ray bursts. He has already achieved important new insights into the nature of supernovae and gamma-ray bursts. Most notably, he recently discovered two new types of explosions, predicted by theorists' decades ago, but only now shown to exist in nature. At the Weizmann Institute, Dr Gal-Yam continues his studies of explosive stellar events by combining extensive telescopic observations with software design and mathematical analysis. He has received many additional honours and awards, including a Colton Fellowship, European Union grants, the Italian Città di Cefalù prize and, most recently, the Gruber Young Scientists Award.



**Dr Anne Green**  
University of Nottingham

Dr Green is a lecturer in theoretical particle physics at the University of Nottingham. She has a BA in Physics from the University of Oxford and a DPhil in early Universe cosmology from the University of Sussex. She held a PPARC postdoctoral fellowship in the Astronomy Unit at Queen Mary, University of London and was a Postdoc in the Field and Particle group at Stockholm University before returning to the UK with a PPARC/STFC advanced fellowship. Her research interests lie at the interface between astrophysics and particle physics. The main focus of her current research is the search for dark matter, in particular the signals expected in direct detection experiments and their dependence on the dark matter distribution. She is also interested in dark energy and early Universe cosmology.



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**Professor Ofer Lahav**  
University College London

Professor Lahav is the Perren Professor of Astronomy and Head of Astrophysics at UCL. He was born in 1959 in Tiberias, Israel and received his BSc from Tel-Aviv University, his MSc from Ben-Gurion University and his PhD from the University of Cambridge. He has held research positions at Cambridge, Princeton and at the Hebrew University. After 13 years as a member of staff in Cambridge he moved to the Perren Chair at UCL in 2004 where he established a Cosmology group, which is heavily involved in new large galaxy surveys for studying Dark Matter and Dark Energy. He is the Chair of the International Dark Energy Survey Science Committee and the Chair of the UK Consortium for this survey. He is currently a holder of a Wolfson Royal Society Research Merit Award. In 2009 Professor Lahav spent a term at the Weizmann Institute as Erna and Jakob Michael Visiting Professor. From May 2010 he is serving as a Vice-President of the Royal Astronomical Society.



**Professor Mordehai Milgrom**  
Weizmann Institute of Science

Professor Mordehai (Moti) Milgrom was born in Romania in 1946 and immigrated to Israel a year later. He completed his BSc in Physics and Mathematics at the Hebrew University in Jerusalem and his MSc and PhD in Physics (serving at the same time in the Israel Defense Forces) at the Weizmann Institute. He has been on the Weizmann staff ever since, becoming an assistant professor in 1975, an associate professor in 1979, and a professor in 1984. He spent extended periods at Cornell University, The Institute for Advanced Study in Princeton and the University of Illinois as well as many extended visits to The Institute of Astronomy in Cambridge, Oxford University, Bonn University and the Institut d'Astrophysique Paris amongst others. Professor Milgrom is known especially for advancing the MOND paradigm. According to this, the goings on in galaxies and other cosmic structures (including cosmology) are not governed by Newton's laws and by Einstein's theory of relativity - instead, a new theory has been propounded, which purportedly takes over in the realm of cosmology.



**Professor Yosef Nir**  
Weizmann Institute of Science

Professor Nir was born in Tel Aviv in 1954. He completed his BSc at the Technion, and his MSc and PhD at the Weizmann Institute. After spending a post-doctoral period at SLAC, Professor Nir joined the Weizmann Institute of Science in 1990, becoming an associate professor in 1994, and a professor in 1998. He spent extended periods at SLAC, Rutgers University and the Institute for Advanced Study in Princeton. He is currently serving as the dean of the Faculty of Physics at the Weizmann Institute of Science and his research interests include LHC physics, particle cosmology, flavour and CP violation, phenomenology of supersymmetric theories and neutrino physics.

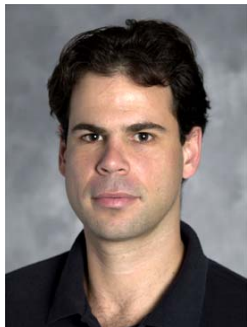
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**Dr Hiranya Peiris**  
University College London

Dr Peiris obtained her undergraduate degree in Natural Sciences (Physics) from Cambridge University in 1998, and her Ph.D. in Astrophysics from Princeton University in 2003. Following her thesis work as a member of the Wilkinson Microwave Anisotropy Probe Science Team, Dr Peiris was a Hubble Fellow at the University of Chicago followed by a STFC Halliday Fellow at the Institute of Astronomy, Cambridge and a Junior Research Fellow at King's College, Cambridge. Dr Peiris is currently a Lecturer in the Department of Physics and Astronomy at University College London. Her primary research interests are in cosmology, observational signatures of physics beyond the Standard Model, and the interface between cosmology and theoretical physics, with a side-line in Galactic structure and evolution.



**Dr Gilad Perez**  
Weizmann Institute of Science

Dr Perez received his PhD from the Weizmann Institute of Science in 2003. He was a Postdoctoral Fellow at Lawrence Berkeley National Laboratory and joined the Faculty of the C. N. Yang Institute for Theoretical Physics at Stony Brook University in 2006. He also held a Visiting Professor position at Boston and Harvard Universities. Since joining the Weizmann Institute of Science in 2008, his research concerns the study of models beyond the standard model of fundamental particle interactions and their experimental implications in astrophysics and colliders. Dr Perez was awarded the Gruber Young Scientist Award in 2009.



**Professor Joe Silk FRS**  
University of Oxford

Professor Silk is Savilian Professor of Astronomy at the University of Oxford and directs the Beecroft Institute for Particle Astrophysics and Cosmology. Most of his scientific research is related to cosmology and particle astrophysics. His specialties include the cosmic microwave background, galaxy formation and dark matter. He has published more than 600 articles and several books. Professor Silk is also a Fellow of the Institute of Physics, the American Association for the Advancement of Science, the American Physical Society, the Royal Society and the American Academy of Arts and Sciences, an honorary member of the French Physical Society and he was awarded the Gold Medal of the Royal Astronomical Society in 2008.



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**Dr Mark Sullivan**  
University of Oxford

Dr Sullivan is a Royal Society University Research Fellow at the University of Oxford. He obtained his PhD in 2001 from the University of Cambridge on the topic of star formation activity in distant galaxies. In the eight years since then, his research interests have focused on the field of cosmology and in particular the study of "Dark Energy", the mysterious and unknown force driving the accelerating expansion of our Universe. His research has an emphasis on the use of cosmic explosions known as type Ia supernovae, using new, large astronomical surveys in the UK and Canada. He has recently joined the "Palomar Transient Factory" survey, a new collaboration involving Caltech, Oxford and the Weizmann Institute of Science.



**Professor Vladimir Usov**  
Weizmann Institute of Science

Professor Usov conducts his research within the Department of Particles Physics. Areas of academic research and interests include generation and propagation of electromagnetic radiation, plasma physics and physical processes in ultra strong magnetic fields. He is particularly interested in compact astronomical objects identified with neutron stars because they provide information about the properties of matter under extreme conditions that cannot be reproduced on Earth, such as very high pressure, density, temperature and magnetic field. A main thrust of his current research is on strange quark-matter stars and their observational appearance.



**Professor Eli Waxman**  
Weizmann Institute of Science

Professor Waxman was born in Petach-Tikva, Israel, in 1965. He studied at the Hebrew University of Jerusalem, within the framework of the IDF Talpiot Program. In 1994 he completed his PhD thesis "Self-similar solutions to Euler's equations" under the supervision of Professors D Shvarts, NRCN, and G Rakavy of the Hebrew University of Jerusalem. From 1994 to 1998 he was a long term member at the Institute for Advanced Study in Princeton, NJ. In 1998 Professor Waxman returned to Israel and joined the Physics Faculty of the Weizmann Institute of Science, where he serves presently as Professor of Physics and Head of the Particle Physics and Astrophysics Department. Professor Waxman's research has also been widely published. His research field is theoretical astrophysics, with focus on high-energy neutrino and cosmic-ray astrophysics, relativistic astrophysics, supernovae and gamma-ray bursts.