

David Berman: Outreach and Public Engagement Work

Summary

David Berman is string theorist that has spent the last 12 years taking part in an extensive set of outreach activities. Over this time he has spoken at over 60 schools and given numerous talks at workshops for teachers and educators. He has given talks at various events promoting science to the general public from small scale talks with an audience of around a hundred to the large scale events with audiences of thousands such as the Stephen Hawking event in Texas (2011), with an audience of over 2500, and the Frieze art fair in (2009), with an audience of 2000. Remarkably his reputation has now reached international level with invitations to speak in public forums in Romania, Korea and Canada. He has written numerous articles for the popular press published in Japan, Korea and of course in the UK. He has written for or been interviewed by Wired magazine, New Scientist, the Guardian, IFLS and Radio 4. He has an extensive web presence with the development of a website in collaboration the Millennium Maths Project popularising research in physics at Queen Mary (funded by an SFTC public engagement award). These webpages now have had over 147,000 page views.

His novel contribution though has been his long term engagement with the arts. This began in 2004 with a contribution to the Royal Academy exhibition with drawings based on string theory research. Since then he has worked with a variety of artists in different media including: flow motion, multimedia artists; Jordan Wolfson, conceptual art; and Grenville Davey, Turner prize winning sculptor. The work with Jordan Wolfson won the Cartier award at Frieze for best newcomer in conceptual art. In this context he has spoken about string theory at major galleries and Art schools such as Tate Modern, The Royal College of Art, The Institute of Contemporary Art and other minor galleries such as Espacio gallery, Core gallery and the Testbed 1.

This work produced two exhibitions appearing in 2014 with artists who have collaborated with Berman. At the prestigious, Chelsea Space gallery, "Interalia 2014" was a set of sculptures inspired by Berman's work on symmetries in string theory produced by Turner prize winner Grenville Davey. At the Ruskin gallery Cambridge, the "Hidden Dimensions" exhibition showed computer animations of the hidden dimensions of string theory with a sound installation. Both exhibitions ran for a month and accumulated thousands of visitors each.

This specific work with the arts community formed the basis of a **REF impact case** and was deemed by the REF panel to have **international importance**. His work in this direction is not just outreach work but a genuine engagement with artists at the highest level.

Talks and publications concerning Science and cultural engagement

Windsor Castle, College of St George, “The two cultures”, a debate on the Arts and Sciences (2015)

Queen Mary, “Art and Science”, a public event with panel discussion on art-science cross over (2015)

Ruskin Gallery, Cambridge, “Beyond the eleven dimension of M-theory”, curation of the exhibition and talk. The exhibition ran for one month in April (2014).

Sommerset House London, “Love and Maths”, panel discussion with film maker and mathematician, Edward Frenkel and producer Jan Harlon (2014)

London Cultural Centre, “Working together”, panel for universities event (2014)

Chelsea Space Gallery, Exhibition of sculptures inspired by M-theory, a collaboration with Grenville Davey. The exhibition ran for a month and received international media coverage including the Wall Street Journal. (2014)

University of the Arts, London, “Theoretical Physics, duality and art”, talk (2014).

White Rainbow Gallery, London, “Phase Transitions”, article for the exhibition catalogue (2014)

The Splice symposium conference, London “Duality and art” (2013)

The Espacio Art Gallery, “Particle physics and art”, London (2013)

The Arts Club, Mayfair, “Strings and beyond” talk (2013)

KIAS Seoul, Korea “String theory, duality and art”, September (2012)

The Isaac Newton Institute, “125GeV”, an exhibition of sculpture inspired by M-theory, (2012)

Testbed, a Chelsea flower show fringe event, “Duality” (2012)

The Octagon, Queen Mary, “Understanding eleven dimensions”, a science/music event, with compositions and improvisation based on my research, played by an ensemble of 8 musicians, funded by an EPSRC grant. (2011)

Core gallery Salon event, London, “Unified theories”, (2011)

The Tate Modern, Turbine Hall, “Black Holes” talk, part of the Miroslaw Balka main Turbine Hall exhibition (2010)

New Scientist invited contribution, ``Art-Science Collaboration" Issue: 8th May (2010)

The London Frieze Art Fair, organiser and developer in collaboration with the artist Jordan Wolfson for the Cartier award winning work on "string theory at the Frieze". This event had major national and international media coverage including a full page Guardian interview and a discussion on "the culture show", BBC2. (2009)

The Institute of Contemporary Art , "String Theory", talk (2008)

Clare Hall in Cambridge, Curated and contributed to the exhibition "Images in Theoretical Physics" (2008)

Invited contribution to the Tech-Mac-Mayacom exhibition Book (2007)

The Royal College of Art: ``String theory" (2006)

The Royal Academy Summer Exhibition, Invited submission, "Membranes ending on a fivebrane" (2004)

Publications

Article for Plus+, a webzine for schools (current page views of article at over 100,000) "Casmir effect and infinity" (2014)

Parity magazine, Japanese popular press, "String theory, duality and art" (2013)

For KIAS magazine, "An introduction to strings" (2012)

Eureka magazine, "String Theory and beauty", (2012)

Interview for Wired magazine (2009)

Article for Plus+, a webzine for schools (current page views of article at over 100,000), ``String Theory" (2007)

Article for Fusion magazine: ``Unification in Science" (2006)

Talks and Events for the general public on general science issues

Institute of Physics, London, Sussex and Kent “One hundred years of General relativity” (2015 and 2016)

Queen Mary “One hundred years of relativity” (2015)

The Ivory Tower, Cambridge “String theory” (2013)

Inside Out festival, London, opening panel (2013)

The Hay Festival of Ideas “Scientific Method”, panel event, part of the How the Light Gets In (2012)

Institute of Physics, London and Kent, “String theory, tool box or ideology?” (2012)

Inside Out Festival, London opening panel (2012)

The Science Museum, Dublin “Theoretical Physics”, December (2011), part of Ignite Dublin series.

The Dana Centre, London, “String theory and unification” November, London (2011)

Stephen Hawking Evening at Texas A&M University with an audience of 2500, April (2011)

Cambridge summer school in Science, “String theory and unification” (2007)

Major Media appearances

Film interview for IFL in collaboration with FTO film on String Theory (to appear 2016)

New Scientist, August (2015), on new ideas for the 21st century

Radio 4, Main contributor to the “Great Lives” programme on Galileo (2013)

New Scientist (2010) on condensed matter and string theory.

Wired (2009) on working with artists

Guardian (2009) on the Frieze art Fair

Outreach Activities for schools

The development of a website dedicated to explaining Physics and Astronomy research at Queen Mary. This was funded by an STFC award for 8800 pounds.

The website now has had over **200,000 page views** since its inception in 2013. See: <https://plus.maths.org/content/researching-unknown>

David Berman was instigator and PI on the grant funding this and the main organiser with the Millennium Maths project team. He also contributed several of the articles.

Following from this a series of posters have been designed and produced and are now sent to schools as part of Queen Mary's school outreach.

The development of a videoconference presentation to schools, organised by the Millennium Maths project. These link several schools around the country for a day covering a central topic: "Relativity for beginners" (2005, 2006 and 2008) and "The mathematics of quantum mechanics" (2007).

Spoken at over 50 schools events over the past fifteen years, either directly in schools or at events for schools organised by 3rd parties.

Enabling and Administration work

The academic director of outreach: responsible for REF impact cases in outreach; liaison between academic staff and outreach professionals, and general support for school of physics outreach activities. This has included the provision of outreach plans for grant proposals and outlines for impact cases.

PhD student training for graduate students in the centre for research in string theory. This has included direct training in giving talks and how to deliver to a variety of age groups.

David Berman has won grants for outreach work from: STFC 8.8k; EPSRC 6k; and the Westfield trust 10k.