

IMA Public Lecture: Hawking and Green

Every year the UK's pure mathematicians and applied mathematicians hold major conferences, the British Mathematical Colloquium (BMC) and the British Applied Mathematics Colloquium (BAMC) respectively, but once every five years these conferences come together in one *super* joint meeting. This year, on 30 March to 2 April 2015, it was the turn of Cambridge University to hold what was the fourth such joint meeting, and I had the good fortune (if that is the right phrase) to chair the Local Organising Committee. We were delighted that the meeting generated enormous interest, and involved more than 600 participants from the UK and overseas, giving in excess of 300 invited and contributed talks on a vast range of topics from all across the mathematical sciences.

A firm and very popular tradition of both the BMC and the BAMC is that a public lecture is organised as part of the meeting, to be attended by conference delegates and members of the general public alike. We were determined to put on something really special and exciting for our meeting, and we were therefore absolutely delighted when our two great colleagues, Professor Stephen Hawking and Professor Michael Green, famed for their work in mathematical physics, both agreed to speak. It was clear from the outset that there would be huge demand for tickets for such an occasion, necessitating the hiring of a very large lecture hall, and we were therefore delighted that the IMA agreed to be our sponsors, thereby making the event possible.

The public lecture itself was from 7 pm to 8.30 pm on Tuesday 31 March. The audience was made up of about 150 conference delegates, about 250 children from local schools and their parents and close on 100 members of the public – tickets for the latter had all been snapped up within just a few seconds of being released online! The IMA's John Meeson and Sam Kamperis took the opportunity to distribute IMA merchandise to young and old alike, while our former IMA President, Professor Tim Pedley, chaired the lecture. In his introduction, Tim talked about the IMA's work, and then highlighted a close connection between the two speakers, in that they are the two immediate past Lucasian¹ Professors at Cambridge University. Coincidentally, it had been announced only a few days before the lecture that Professor Mike Cates of Edinburgh University, an expert in the physics and mathematics of soft matter, had been elected as the new Lucasian Professor from 2015.

Stephen Hawking took to the stage first, to give a lecture entitled *Quantum Black Holes*. As you would expect from such an accomplished science communicator, Hawking gave a brilliant and highly accessible account of the physics of black holes. He talked about how that theory can be related to ideas from thermodynamics (for instance, black holes have a temperature) and

about his own most famous contribution, Hawking Radiation. The resolution of the apparent contradiction of information being lost as it passes the event horizon (a subject on which Hawking himself was apparently on the losing side of a long-standing bet) was described with great humour.



Professors Tim Pedley, Stephen Hawking and Michael Green at the Public Lecture.

It was then Michael Green's turn, and he gave an equally exciting talk entitled *The Pointless Universe*. As one of the founders of superstring theory, one of the most active and exciting areas of mathematical physics, Green was able to give a unique insight into attempts by himself and others to answer some of the most basic questions about our Universe. For instance, three of the most fundamental numbers in nature, Newton's gravitational constant, the speed of light in a vacuum and Planck's constant from quantum mechanics, can be combined together to give a fundamental time scale, the Planck time, which is about 5×10^{-44} seconds. However, despite being such a fundamental measure of time, the Planck time is many many orders of magnitude shorter than even the shortest measurable events. A theory unifying gravity and quantum mechanics is of course the Holy Grail for Green and his colleagues.

There was no doubt that the audience thoroughly enjoyed their evening. For me the most exciting, and rather moving, part was seeing so many young people absolute enthralled by what they were hearing (and incidentally concentrating for well over 1×10^{47} Planck times!). Communicating the excitement of mathematics and science to the next generation is of course one of the most important things we can do, and the IMA's role in this event is very much appreciated.

Nigel Peake CMath FIMA
University of Cambridge

1. The Lucasian chair, one of the most famous academic positions in the world, was first endowed in 1663, and other past Lucasian Professors include Newton, Babbage, Stokes, Dirac and Lighthill – the IMA's founding President.