

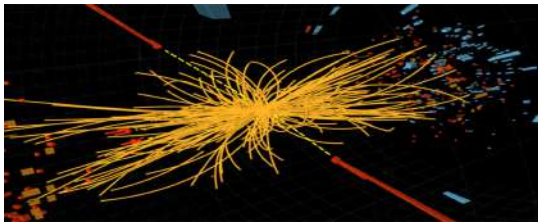
11 May 2023

Prof. Konstantinos Nikolopoulos

University of Birmingham

## In search for the origin of Mass

One could say that the Universe is both very simple and very complicated. It is very simple in the sense that we know of basic fundamental laws and principles that rule its behaviour, from particles to the cosmos as a whole, in an incredible amount of detail. Mass, for instance, one of the key concept in physics, arises from the so-called Higgs mechanism. Yet it is complicated because as consequences of such physical laws, we are faced with mysteries, such as most of the universe consisting of dark matter and dark energy, which are there in the theory to account for what we see, but that is not in plain sight when look it up in the sky. In this Lecture, Prof. Nikolopoulos, one of the physicists who discovered the Higgs boson, will discuss the origin of mass in the universe and what we currently know about Dark matter.



## Lecturers

Kenna



Kavokin



Cherotchenko



Laussy



del Valle



Khechara



Berloff



Taylor



Nikolopoulos



University of Wolverhampton  
City Campus, Wulfruna building  
Wulfruna street, Wolverhampton  
WV1 1LY



This is free  
and open to all

# IOP

Institute of Physics



**22 September 2022**

Prof. Ralph Kenna  
University of Warwick

## Statistical physics meets comparative mythology

Prof. Kenna is a statistical physicist whose interests do not limit to phase transitions and critical phenomena but go deeper into digital humanities and sociophysics. Using methods he learned to describe physical systems but applied to, say, the mythology of his ancestors (he is Irish), he was able to show that despite a predominant male representation in its iconography (including in his passport), women are in fact quite well represented in Irish mythology—at least better represented there than in other epic narratives—including the Classics (and modern Game of Thrones). In this inaugural Lecture, he will discuss how statistics allows to better understand even hopelessly complex systems such as long-gone humane societies and present an Art competition that he set up to promote female figures.

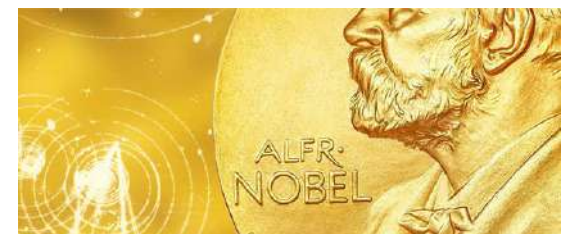


**13 October 2022**

Prof. Fabrice Laussy  
University of Wolverhampton

## The Nobel Prize in Physics

The Nobel Prize is synonymous with the most prestigious award that can be bestowed upon the human's endeavours to serve and advance humanity, from Peace to Literature and passing by the most fundamental of all Sciences: Physics. At such, it is one of the most highly regarded events in the Year, pointing at the latest directions in which the human's genius has been doing wonders. It is also a treasure trove of anecdotes, injustices, curiosities and mistakes that make the delight of everybody interested in what's buzzing in the highest intellectual circles, something between gossips and the History of Science. In this Lecture, Prof. Laussy will give his traditional Nobel Lecture where, along with the most crunchy bits of this socio-scientific celebration, he presents in layman's terms the Science honoured on this Year (recipients unknown at the time of writing but not at the time of Lecturing).



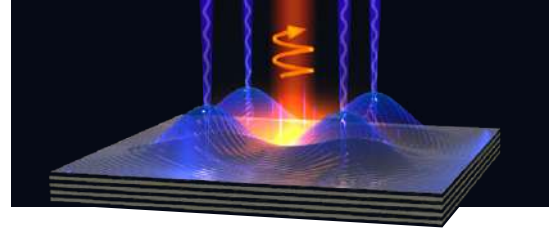
**IOP Institute of Physics**

**24 November 2022**

Prof. Natalia Berloff  
University of Cambridge

## Making light to compute

The vast majority of real-life optimisation problems are hard and computationally impractical for conventional classical computers, with classic examples being the travelling salesman problem, the dynamic analysis of financial markets, the prediction of new chemical materials, finding the ground state of a spin glass, and machine learning tasks. Quantum computing is widely promoted as a potential solution for this class of problems; however, this approach faces many technological challenges. Research in quantum computing has inspired the development of promising new algorithmic and hardware techniques that avoid the hardest technical challenges facing quantum computing while delivering significant advantages over classical computers. Photonic or hybrid light-matter platforms in particular show potential for fast neuromorphic-type energy-efficient computing. Prof. Berloff will discuss the principles of the operation of the devices based on such systems, and the challenges they present, with a particular focus on polariton graph simulators.



**15 December 2022**

Prof. Alexey Kavokin  
Westlake University 国际极化激光研究中心, China

## Physics on a Möbius stripe

The Möbius stripe is topological magic on the table: twist a piece of paper and attach it to itself and you get a non-orientable surface with no notion of clockwise and counter-clockwise! Things acquire strange properties in this peculiar space. For instance, going round once turns you into your mirror image. Cutting through the stripe with scissors produce a longer non-Möbius stripe and doing this again now produce two entangled Möbius stripes! If already a scissor can result in such a complex phenomenology, what else is possible in this geometry? Prof. Kavokin will discuss the case of what is also unfathomable to one's most hardened intuition: quantum theory. If you think you understand quantum mechanics, come and see if you understand it on the Möbius stripe.



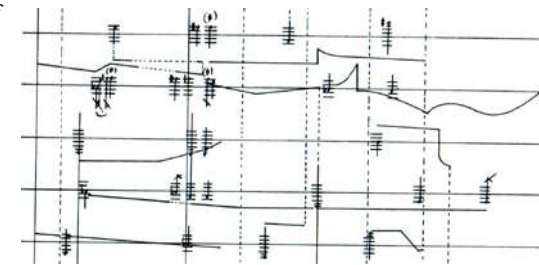
Evening Lectures  
Programme 2022–2023

**12 January 2023**

Dr. Elena del Valle  
Universidad Autónoma de Madrid

## Music and Noise

What distinguishes music from noise? What is agreeable to hear and what is not? Cannot the sound of a waterfall be soothing, relaxing and inspiring? On the opposite, aren't some of the most crafted musical compositions among the most difficult ordeals to go through for many? Is the choice of what constitutes art and what constitutes chaos an artistic, cultural, subjective one? Or is there a scientific fingerprint that can, breaking down what we hear into frequencies and power spectra, identify what makes a sound worthy of an orchestra or a pandemonium? In this musical Lecture, Dr. del Valle will discuss the Physics of music and explore unsuspected corners of this intemporal humane practice, showing us a way to their possibly happy encounter with the modern concept of *noise music*.



**23 February 2023**

Dr. Tom Taylor  
Senior Physicist - Moltex Energy  
**The Physics of Advanced Nuclear Reactors**

Our continued dependence on fossil fuels has been thrown into sharp focus by the cost of living crisis, with energy costs becoming less and less affordable. Events in Ukraine have also highlighted the reliance of Europe on Russia for natural gas supplies. Nuclear power is increasingly seen by governments as essential in decarbonizing energy—affordably and with security of supply. In this lecture, Dr. Taylor, a Reactor Physicist at Moltex, will describe some of the pros and cons of nuclear—to help you judge nuclear power relative to the other options for reaching net zero. A summary will be presented of the status of advanced nuclear technologies in the UK and internationally, including the molten salt reactor designs being developed by Moltex. The fascinating physics of these systems will be demonstrated, and the key challenges which physicists can solve to unlock their potential.



**16 March 2023**

Dr. Evgenia Cherotchenko  
Ioffe Physical-Technical Institute

## Physics Olympiads

### & how to train a "genius"

The International Physics Olympiad (IPhO) branched from its somewhat more famous and acknowledged mathematical ancestor. Just like the latter, the physics olympiads helped to recognize and develop countless talents and brought many geniuses into the world of physics research. Dr. Evgenia Cherotchenko will give a tour of the movement's history and will share her experience in training young physics prodigies as well as her thoughts on how independent original research is different from solving extremely hard olympiad problems in physics. A Lecture not to miss for amateurs of difficult problems as well as for anybody interested in competition at the highest level.



**20 April 2023**

Dr. Martin Khechara & the STEM response team  
University of Wolverhampton

## **! DANGEROUS !** experiments in Physics

As every other enterprise of exploration, Science can be quite a risky business. Some of the most dangerous experiments ever performed—like the Trinity test, with controlled fusion, with the LHC close to creating black holes, at the Extreme Light Infrastructure on the verge of tearing-out spacetime—are within the realm of Physics (experiments in biology and/or with people can also be notoriously nasty). In this closing lecture to the Series (not coming last for safety reasons), Dr. Khechara and his team—who regularly go where nobody went before—will give an overview of some of the most dangerously mad experiments ever performed, and will actually proceed to bring some of them on stage, putting themselves at risk against the elements of Nature, in a fight against electricity, radioactivity, gravity, chemistry, light and matter. All in under 1h.



#IOPwlv @PhysWlv