

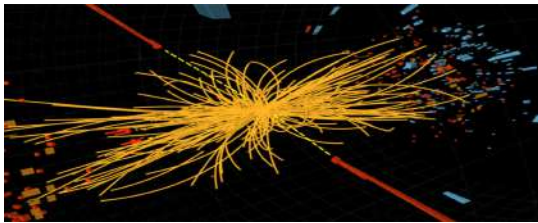
11 May 2023

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 principle that rule its behaviour, from particles to the cosmos as a whole, in an incredible amount of details. Mass, for instance, one of the key concept in physics, arises from the so-called Higgs mechanism of breaking the symmetry of a field that becomes nonzero due to its Mexican hat potential. 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  
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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.

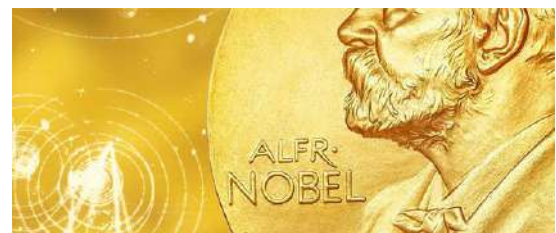


13 October 2022

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).

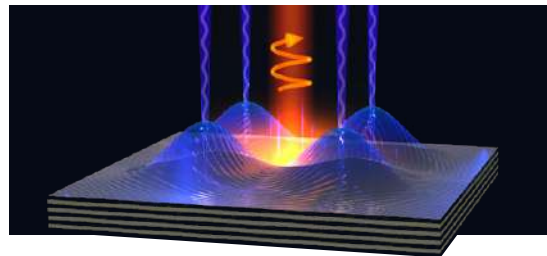


24 November 2022

Prof. Natalia Berloff  
University of Cambridge

## Quantum Simulators of Light & Matter

If quantum mechanics can make a cat dead and alive at the same time, cannot it also, more usefully, make a bit of information hold its two values—0 and 1—simultaneously? It can! A quantum computer is a machine that works with such *qubits*, with the effect of achieving performances out of reach of our current technologies. They are however too tricky to implement yet. A similar concept, a *quantum simulator*, could render services equally valuable by bringing the problem to analog computation, with continuous variables rather than binary data. Prof. Berloff will explain the underlying principles and introduce a promising platform to possibly realize such a sci-fi looking technology in the near future, thanks to macroscopic quantum states of light and matter, known as *polaritons*, with unique predispositions for technology, and which, she realized, see their dynamics solve important algorithmic problems when placed in lattices.



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.

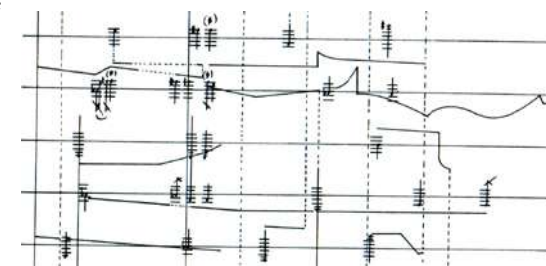


12 January 2023

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 Nuclear Reactors

The XXth century will be that of information. Physics has long told us, however, that information is energy, and in addition to providing for our needs in terms of moving, lighting and heating, we must now face a World with an exponential growth of energy needs, on a fragile planet with limited resources. Questions relative to our energy production become increasingly pressing at a societal level, with choices to be made from the several options opened to us, from green ones involving the wind and sun, to nuclear ones, by smashing the atom. A good understanding is key to a responsible opinion. In this Lecture, Dr. Taylor, a Reactor Physicist at Moltex, will provide a didactic introduction to the fascinating physics of nuclear reactions in the problem of energy harvesting, opening a window on trending implementations, such as the molten salt reactor which he contributes to design, survey the main problems of the field and discuss its possible solutions.



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.

