



Neutrino Physics: experimental, theoretical and philosophical approaches.

Are you there Neutrino? It's me, the Standard Model.



**ANNUAL MAXWELL SOCIETY
CONFERENCE**

Ticket: FREE

Mon, 22 Feb 2021, 13:00 - Fri, 26 Feb 2021, 19:00 GMT

MAXWELL SOCIETY

We are excited to welcome you to Maxwell Society's annual conference. This yearly event gives people the chance to learn about the latest research and theories on a field of physics.

Usually we would be holding this in Cumberland Lodge, the dainty lodge in Windsor. But this year, the pandemic has meant that we had to quickly adapt to being online. The committee pulled together and worked tirelessly to bring this exciting line up of speakers to you. We hope that you enjoy!

INTRODUCTION

There is so much that we don't know about neutrinos. Aptly named, their name means "little neutral one," as they have a small mass and carry no charge.

We know them as subatomic particles that interact through only gravity and the weak force. Their lack of interaction with other matter means that they are very difficult to detect.

Consequently, neutrinos still remain largely a mystery to us.

We will explore how neutrinos stack up to our currently known idea of the Standard Model. We will be looking at them through an experimental and theoretical view, as well as discussing how philosophy can be used in physics.



Schedule

MONDAY 22



12:45pm-1pm:

Introduction to the
Conference

1pm - 2pm Seminar:

"Neutrinos, the Sun, other
stars, and life" - Professor
D Indumathi

6pm - 7pm Networking

Event:

Quiz (with prizes!)

TUESDAY 23



10am - 11am Seminar:

"Neutrinos helping to
explain the Universe" -
Professor Francesca Di
Lodovico

11am - 12pm Seminar:

"Astrophysical neutrinos
and beyond" - Dr Teppei
Katori

6pm - 8pm Networking

Event:

Movie night

WEDNESDAY 24



1pm - 2pm Seminar:

"Neutrinos, the Sun,
New Physics and Dark
Matter Detectors." -
Professor Malcolm
Fairbairn

6pm - 7pm Networking

event:

Wellbeing with origami

THURSDAY 25



1pm - 2pm Seminar:

"Sterile neutrinos:
towards a unified
theory of cosmology
and particle physics" -
Associate Professor

Oleg Ruchayskiy

6pm - 7pm Networking

event:

Game Night

FRIDAY 26



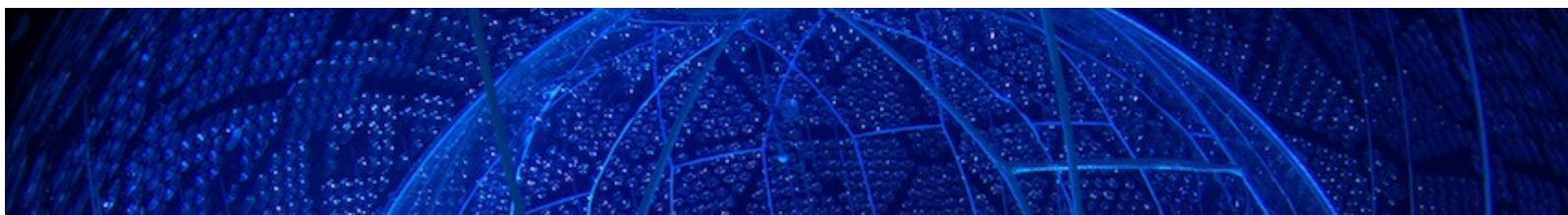
1pm - 2pm Seminar:

How Scientific
Problems Shape
Theory Development-
Dr Radin Dardashti

6pm - 7pm

Networking event:

Quiz (with prizes!)



Speakers

PROFESSOR D INDUMATHI

(THE INSTITUTE OF MATHEMATICAL SCIENCES,
CHENNAI)

Neutrinos, the Sun, other stars, and life

Scientists believe that all matter is made up of elementary particles, that is, fundamental building blocks. Neutrinos are one among them but very special. This talk will introduce these particles and highlight the key role they play in describing how the Sun and other stars shine, and how life on Earth will not be possible without these exotic particles. Along the way, we will mention why neutrinos are taking centre-stage in many experiments current and proposed across the globe. The India-based Neutrino Observatory is one such proposal and we will briefly highlight the key goals of this project.

PROFESSOR FRANCESCA DI LODOVICO

(KING'S COLLEGE LONDON)

How Neutrinos help to explain the Universe

Neutrinos are a key ingredient to possibly explain the current matter-antimatter in the Universe. Studying whether neutrinos and antineutrinos behave in the same way and also whether neutrinos behave like the usual matter or not are main topics of the current and future neutrino experiments. Francesca will introduce the problem and how neutrino properties are being investigated by the current and future neutrino experiments.





DR TEPPEI KATORI
(KING'S COLLEGE LONDON)

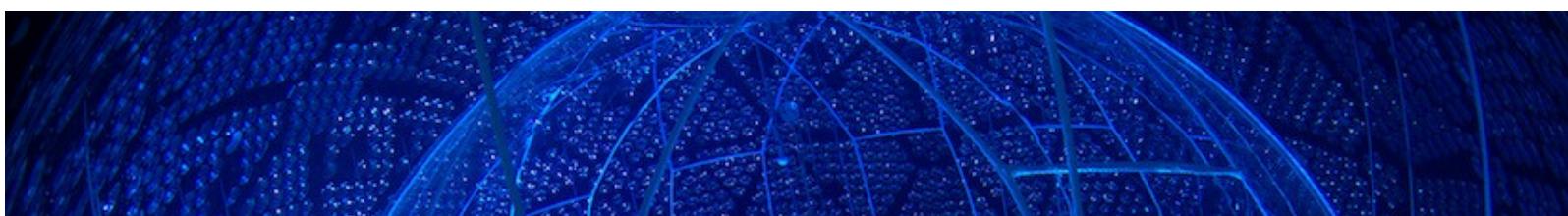
Astrophysical neutrinos and beyond

Neutrino astronomy is a new field to study celestial objects with neutrinos. Optical telescopes observe star lights emitted from the star surface with different wavelengths. Unlike light, neutrinos are emitted only from deep-inside of the stars and galaxies, and they are related to the most extreme phenomena in the universe such as supernova and supermassive black holes. These high-energy neutrinos may show us new fundamental physics too! In this talk, Teppei will introduce neutrino telescopes in the world, and the physics of astrophysical neutrinos.

PROFESSOR MALCOLM FAIRBAIRN
(KING'S COLLEGE LONDON)

Neutrinos, the Sun, New Physics and Dark Matter Detectors.

Malcolm will be talking about how neutrino detectors and dark matter detectors will both explore neutrinos in the future, and what this can tell us about neutrinos, physics beyond the standard model and the Sun.



ASSOCIATE PROFESSOR OLEG RUCHAYSKIY

(UNIVERSITY OF COPENHAGEN)

Sterile Neutrinos - Unifying Cosmology with Particle Physics

Several well-established observational phenomena -- neutrino masses and oscillations, the matter-antimatter asymmetry of the Universe, dark matter -- do not find their explanation within the otherwise successful Standard Model of particle physics. This means that some new, yet unknown particles and interactions should exist.

We do not know their properties, not even their masses. It may well be that these particles have so far evaded their detection not because they are beyond the reach of our accelerators, but because they are below the sensitivity of our detectors.

In this talk, Oleg will present a scenario that unifies particle physics with cosmology, while adding only three new particles to the Standard Model -- heavy neutral leptons (also known as “sterile neutrinos”). Although this extension looks very “mild” and “minimalistic”, it provides a resolution to the beyond-the-Standard-Model problems, testable both in the lab and in space.

DR RADIN DARDASHTI

(THE UNIVERSITY OF WUPPERTAL)

How Scientific Problems Shape Theory Development

The everyday practice of scientists is to a large extent determined by the scientific problems they are confronted with. The conceptual analysis of scientific problems and how they change, therefore, may allow for a fine-grained investigation of the development of a scientific discipline. In this talk I discuss what constitutes a scientific problem, what its elements are and how they change. This talk will illustrate the advantages of a more problem-focused approach in understanding the development of modern particle physics and hopefully shed some light on some open problems in particle physics and whether they constitute “genuine” problems.



Certification

BRONZE

Attending all events

SILVER

Completing mini quizzes for each talk + Attending all events

GOLD

250 word output or equivalent artistic output +
Completing mini quizzes for each talk + Attending all events

