



## Series 3 - 2016

Course title:

### *Hot Topics in Physics*

Dates: **Mondays, 5 September - 10 October**

Time: **2:15 - 4:15 p.m.**

Venue: **Leith Bowling Club, 2 Duke St, Dunedin**

(Enrolments for this course will be limited to **110.**)

**Course fee: \$45.** Tea and coffee provided

**Course Organiser:** Doug Holborow  
*courses@u3a.org.nz*

**Course Assistants:** t.b.a.

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Website:

*[u3adunedin.org.nz](http://u3adunedin.org.nz)*

If you would like to apply for more than one course, please rank your choices. If you enrol via our website **please complete payment of the appropriate fees** EITHER by internet banking (include Membership No. in Reference box), OR by cheque (to: Programme Secretary, U3A Dunedin, PO Box 6491, North Dunedin 9059.)

All applications must be received by **Wednesday 10 August 2016** and you will receive a response to your application by Friday 19 August 2016.

Please contact the Programme Convenor ([courses@u3adunedin.org.nz](mailto:courses@u3adunedin.org.nz)) or the Secretary ([mw.potter42@gmail.com](mailto:mw.potter42@gmail.com), 453 4721) with any queries.

### **Postponements:**

Check the website: [u3adunedin.org.nz](http://u3adunedin.org.nz) or listen to:

The Breeze 98.2 FM — Radio Dunedin 99.8 FM — MoreFM 97.4 FM

**Please note:** please no recording, photographing or videoing at any session in any of the courses.

***Please keep this brochure as a reminder of venue, dates, and times for the courses for which you apply.***

# Hot Topics in Physics

This course will be presented by members of the Department of Physics, University of Otago. They will be discussing their particular areas of interest and expertise.

## **5 September    Quantum Mechanics and modern technology**

Quantum mechanics has been a central topic in Physics for about a hundred years. Today this area of research is richer than ever with a huge focus on the control and manipulation of individual quantum systems (e.g. single atoms). I will give an overview of the concepts of quantum physics, current research areas, and the technologies this will deliver.

*Presenter: Professor Blair Blakie*

## **12 September    From the proton to the Higgs boson**

The recent discovery of the Higgs boson was announced with great fanfare, and the prompt award of a Nobel prize - but what is it, and what is its significance? I will review some earlier discoveries, and the path to the now widely accepted "standard model" of particle physics. The concepts of quarks and leptons, and their interactions, will lead us to the Higgs boson.

*Presenter: Professor Rob Ballagh*

## **19 September    Sea ice, ice shelves and sea level rise**

Sea ice is frozen ocean. An ice shelf is continental or glacier ice that has flowed from the land out over the coast and on to the ocean. Sea ice and ice shelves float so will not contribute directly to sea level rise when they disintegrate and melt in a warming climate. Does this mean we do not need to care about their demise? I will discuss the interdependencies between the cryosphere and the oceans.

*Presenter: Professor Pat Langhorne*

## **26 September    Quantum physics in biological systems**

Without quantum mechanics there is no life. Not even atoms. In a trivial way, via chemistry, all life depends on quantum mechanics. But has nature evolved to use quantum physics in a non-trivial way to improve its fitness? Examples including the mechanism for avian navigation, olfaction in insects and the role of quantum interference in photosynthesis perhaps suggest she has. We will explore these examples with emphasis on work being undertaken in this area in my group.

*Presenter: Professor David Hutchinson*

## **3 October        Gravitational Waves: Heartbeats of the universe**

Einstein predicted gravitational waves from his general theory of relativity. Now, for the first time, these ripples in the fabric of space-time arising from cataclysmic events in the distant universe have been detected arriving at Earth. A new realm of information is now available, as if we were a deaf person suddenly gaining the ability to hear sound. We're going to hear more things, some expected and, no doubt, some very surprising. This unique window onto the cosmos heralds a new era in our understanding of the universe.

*Presenter: Dr Eyal Schwartz*

## **10 October        And the Sun went "Bang": An overview on Space Weather research**

The Sun is the main provider of energy for the Earth; without it we would surely die. However, the Sun is not just a huge light bulb sending heat and light to us - it is a gigantic fiery ball of burning gas on which the largest explosions in our solar system take place. The highly dynamic Sun affects the Earth in multiple ways. We are only just starting to understand how the Sun drives "Space Weather" - changes in the environment on and around the Earth which affect our technological systems.

*Presenter: Professor Craig Rodger*