



## 2023 Series 3 Course A

<b>Title</b>	<b>Cat out of the Bag</b> The weird and wonderful world of particle physics
<b>Date</b>	<b>Tuesdays 15 August – 19 September 2023</b>
<b>Time</b>	<b>10 am – 12 noon</b>
<b>Venue</b>	<b>Otago Golf Club, 125 Balmacewen Road, Dunedin</b>
<b>Convenor</b>	Graham Mason Email: <a href="mailto:graham.mason@xtra.co.nz">graham.mason@xtra.co.nz</a> Phone: 027 499 2388
<b>Developer</b>	Graham Mason
<b>Course fee</b>	\$50 (please do not pay until you receive an invoice)

The standard model of particle physics remains our best description of the building blocks of matter and the forces that govern them, excepting gravity. This introductory course will explain why quantum physics is necessary, how it developed from its early beginnings, and gives some modern examples of its use. All speakers are from the University of Otago's Physics Department.

**All applications must be received by Thursday 20 July 2023.** You will receive a response to your application by Monday 24 July 2022.

Please contact the Programme Secretary [courses@u3adunedin.org.nz](mailto:courses@u3adunedin.org.nz), phone 467 2594 with any queries.

# Cat out of the Bag

- 15 August **Why did Quantum Physics emerge?**  
*-Dr Terry Scott*  
Describes why Quantum Physics was “needed” to describe certain phenomena, particularly considering, in simple terms, light as both a wave and a particle.
- 22 August **How did Quantum Physics emerge?**  
*-Dr Terry Scott*  
Explains the beginnings of Quantum Physics as a tool needed, and subsequently used, by physicists, such as Schrödinger, to understand and elucidate previously inexplicable observations.
- 29 August **Development of Quantum Mechanics in the majority of the 20<sup>th</sup> century**  
*-Professor David Hutchinson*  
Using examples, describes how Quantum Physics developed from its emergence throughout the 20<sup>th</sup> century and gave rise to the many uses, such as quantum computing, in practice today.
- 5 September **Topical 21st century: Quantum nature of light**  
*-Associate Professor Jevon Longdell*  
Light is a wave, but also exhibits some particle-like properties. Quantum mechanics was used to describe light, and is now essential when one manipulates certain states of light, especially true as in quantum computation, as one form of quantum memory is based on storing light in a crystal.
- 12 September **Topical 21st century: Quantum Entanglement and Cryptography**  
*-Associate Professor Harald Schwefel*  
Quantum mechanics not only gives a more precise description of the microcosm, the field of atomic and subatomic particles, but also brought its own effects, such as entanglement, that were not possible previously. Researchers entangle photons nowadays, which is beneficial for information processes, and hence doing computation using quantum computers, and is useful for secure communication.
- 19 September **Topical 21st century: Quantum colliders**  
*-Professor Niels Kjaergaard*  
Where Europe has the largest collider, Niels, a world leader in the field, has built the smallest. He helps our understanding of why we have two kinds of particles in nature which we were previously unaware of, plus how these two kinds behave quite differently, and how Rutherford could have discovered these particles before the machinery of quantum mechanics demanded their existence.