



# FLEET

ARC CENTRE OF EXCELLENCE IN  
FUTURE LOW-ENERGY  
ELECTRONICS TECHNOLOGIES

## PUBLIC LECTURE

# When freezing cold is not cold enough:

*New forms of matter near  
absolute zero temperature*

## WOLFGANG KETTERLE

Nobel Laureate in Physics  
Massachusetts Institute of Technology



**Abstract:** Why do physicists freeze matter to extremely low temperatures? Why is it worthwhile to cool to temperatures which are a billion times lower than that of interstellar space? In this talk, I will discuss new forms of matter, which only exist at extremely low temperatures. Low temperatures open a new door to the quantum world where particles behave as waves and "march in lockstep".

In 1925, Einstein predicted such a new form of matter, the Bose-Einstein condensate, but it was realized only in 1995 in laboratories at Boulder and at MIT. More recently, cold atoms have become a tool to study phenomena of condensed matter physics at huge spatial magnification at densities which are a billion times lower than ordinary materials.

**About the Speaker:** Prof. Wolfgang Ketterle is a pioneer in the field of Bose-Einstein condensation in dilute atomic gases of alkali atoms, which earned him the 2001 Nobel Prize in Physics, together with Eric A. Cornell and Carl E. Wieman.

He was the first to demonstrate an atom laser, the realisation of molecular condensates and the study of superfluidity in atomic systems. He is currently the John D. MacArthur professor of physics, director of the Center of Ultracold Atoms and Associate Director of MIT's Research Laboratory of Electronics.

**DATE:** 30 November 2017  
**TIME:** 7:00PM–8:00PM  
**VENUE:** AMDC Building, Room 301  
Swinburne University of Technology

**REGISTRATION ESSENTIAL:**  
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