P.A.M. DIRAC (1902-1984)

Paul Adrien Maurice Dirac was born in Bristol, England, on 8 August 1902. He studied engineering in his hometown, and obtained his degree in physics and mathematics at Cambridge University, where in 1932 he became professor of mathematics in the Lucasian Chair, which had been held by Sir Isaac Newton two centuries earlier. After his retirement, Professor Dirac went to live in Tallahassee, Florida, where he taught at Florida State University from 1971 until his death on 20 October 1984.

A member of the Royal Society since 1930, he won the Royal Medal in 1939 and the Copley Medal in 1952. Professor Dirac shared the Nobel Prize for Physics with Erwin Schrödinger in 1933. He invented the well-known relativistic wave equation predicting the existence of spin and of the positron when he was only 23 years old. His further work includes his formulations of quantum field theory, statistics of fields and particles, gravitational waves and the prediction of magnetic monopoles.

Dirac first came to Trieste in June 1968 on the occasion of the International Symposium on Contemporary Physics, at which he delivered a lecture on the methods of theoretical physics. After this symposium, Dirac was a guest of honour at the Centre for a month or so nearly every year. In 1972, at a symposium on The Physicists' Conception of Nature organized in honour of Dirac on the occasion of his 70th birthday, he gave a lecture on Fundamental Constants and their Development in Time. Dirac also attended the Marcel Grossman Meeting held at the Centre on the centennial of the birth of Albert Einstein in 1979.

Abdus Salam, who proposed the institution of the Dirac Medal, was Dirac's student at Cambridge and it was after having listened to Dirac's lectures that he decided to devote his life to research rather than becoming a civil servant in his country. He remained in touch with his master and became his friend.

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DIRAC MEDAL

Abdus Salam with P.A.M. Dirac
Cambridge University, 1965

2018 DIRAC MEDAL CEREMONY

28 March 2019
ICTP Budinich Lecture Hall
14:00

ICTP
The Abdus Salam
International Centre
for Theoretical Physics
IAEA

THE 2018 DIRAC MEDAL AND PRIZE

ICTP awarded its 2018 Dirac Medal and Prize to three distinguished physicists - Subir Sachdev of Harvard University, Dam Thanh Son of the University of Chicago, and Xiao-Gang Wen of the Massachusetts Institute of Technology - for their independent contributions toward understanding novel phases in strongly interacting many-body systems, introducing original cross-disciplinary techniques.

CEREMONY PROGRAMME

Welcome by Fernando Quevedo, Director, ICTP

David Tong (University of Cambridge, UK)
Introduction to the work of the awardees

Dirac Medal Lectures

Subir Sachdev (Harvard University, USA)
Strange metals and black holes
The 'strange metal', a state of matter formed by electrons in many modern materials, including the compounds which exhibit high temperature superconductivity. In this state, electrons quantum entangle with each other and conduct electric current collectively (rather than one-by-one, as in an ordinary metal like copper). Quantum entanglement also has remarkable effects near the horizon of a black hole, leading to the Bekenstein-Hawking black hole entropy, and the Hawking temperature. Surprisingly, there is a deep connection between the nature of quantum entanglement in strange metals and black holes, and this has led to mutually beneficial insights. This connection is simply described by the Sachdev-Ye-Kitaev model, which leads to a common set of equations describing the quantum dynamics of certain strange metals and black holes.

Dam Thanh Son (University of Chicago, USA)
From fractional quantum Hall effect to field-theoretic dualities
The fractional quantum Hall fluid is one of the most nontrivial strongly interacting fluids of nature. Many phenomena occurring in this fluid can be explained by postulating a new type of quasiparticle - the composite fermion. I will describe the new "Dirac composite fermion" theory, which has provided a simple solution to some long-standing puzzles and at the same time has stimulated the discovery of a large number of new dualities between quantum field theories in (2+1) dimensions. I will also describe physical consequences of the new theory.

Xiao-Gang Wen (Massachusetts Institute of Technology, USA)
Topological order and non Abelian statistics
Topological order describes a new kind of quantum matter (ie matter at zero temperature) beyond symmetry breaking. In this talk I will concentrate on one of the exotic properties of topological order in 2 space dimension: non-Abelian statistics, which is a generalization of the familiar Bose and Fermi statistics. It turns out that non-Abelian statistics allows us to us topologically ordered materials to perform topological quantum computations.