

Interdisciplinary Laboratory for Natural Sciences and Humanities

Seminars of History of Science

23 November 2016, 3 pm room 138

**Malcolm Longair , FRS
Cavendish Laboratory, Cambridge (UK)**

'... a paper ... I hold to be great guns': How Maxwell discovered the Laws of Electromagnetism

Summary

2015 was the 150th anniversary of Maxwell's great paper 'A dynamical theory of the electromagnetic field'. In this lecture, Maxwell's route to the discovery of his equations will be analysed. His thinking was strongly based upon the use of analogy between mechanical and electromagnetic phenomena. Many remarkable features of his great paper of 1865 will be described, including his construction of a mechanical model to demonstrate electromagnetic induction. It will be shown how easily his mathematical physics translates into the modern SI system. Tragically, Maxwell did not live to see the complete validation of his equations as a result of Hertz's remarkable experiments of 1887, eight years after his death.

6 December 2016, 4 pm room 138

**Don Zagier
Max Planck Institute of Mathematics (Bonn) and ICTP (Trieste)**

Mathematics in another world: the emergence of an independent Japanese mathematic

Summary

From the beginning of the 17th century until 1857, when they were forcefully made to rejoin the outside world, Japan pursued a policy of total isolation (sakoku), allowing no foreigners to come except for one Dutch ship per year under strict control and not allowing any Japanese to leave and return under penalty of death. During this period they developed an extremely interesting indigenous mathematics (wasan). In particular, the two great mathematicians Seki and his student Takebe made many of the same mathematical discoveries as Bernoulli, Euler, Leibniz or others in the West, but often in an almost unrecognizably different form. I will try to give an impression of both the historical context and of the actual mathematics they developed.

18 January 2017, 3pm room 138

**Elena Castellani
Università di Firenze**

Symmetries in physics: historical and philosophical aspects

Summary

Considerations based on the group theoretical notion of symmetry dominate modern physics, at all scales of the physical description. In the philosophy of science community, the role and meaning of physical symmetries is a relatively recent subject and, apart from some notable exceptions, literature devoted to systematic philosophical reflection on the issue started to appear at the beginning of this century. Since then, the subject has flourished and the significance of gauge symmetry, quantum particles, the role of symmetry breaking and the empirical status of symmetry principles have become some of the most discussed topics in today's philosophy of physics. The talk aims at giving a survey of this debate's main points and arguments, highlighting how the issues relate to more traditional problems in the philosophy of science, such as the status of the laws of nature and, more generally, the relationships between mathematics, physical theory and the world. To lend some depth to the survey, the talk begins with some historical remarks, including a brief description of the historical roots and emergence of the concept of symmetry at work in modern physics.

22 February 3 pm room 138

**Luisa Bonolis,
Max Planck Institute for the History of Science**

From white dwarfs to collapsing superstars. The emergence of relativistic astrophysics.

Summary

Starting from the mid 1920s, theoretical developments in studies of superdense celestial bodies, the evolving relationship between nuclear physics, astrophysics and cosmology and the new conditions provided by post-war science, eventually led to the recognition in the early 1960s that physical processes exist in the universe in which considerations of general relativity have a dominant role or even that are understandable only in terms of Einstein's theory.

