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CAMBRIDGE SOCIETY FOR THE APPLICATION OF
RESEARCH

The Large Hadron Collider at CERN (and other particle colliders)

Professor Sir Chris Llewellyn Smith, FRS
The Provost, University College, London

Monday 20th May, 2002: **7.30 p.m. - 9.00 p.m.**¹
The Wolfson Lecture Theatre, Churchill College, Cambridge

Chair: Prof Bryan Webber FRS, Dept of High Energy Physics at the Cavendish Laboratory

Vote of Thanks: Sir Sam Edwards FRS, our President and formerly Director of the Cavendish

Professor Llewellyn Smith writes:

Engineers and physicists at CERN and in over fifty countries are constructing the world's most powerful accelerator – the Large Hadron Collider (LHC) – and associated giant experimental detectors. LHC experiments will improve our understanding of the (sub-atomic, sub-nuclear) constituents of matter and the forces that control their behaviour, and how the universe evolved into its present form following the big bang. Our present, incomplete understanding of constituents and focus will be outlined, together with some of the open questions that will be addressed by LHC experiments and other colliders. Examples will be given of the extraordinary technical challenges involved in constructing the LHC, which span civil, mechanical and electrical engineering, and informatics. The LHC is the first large global scientific construction project: lessons that it may provide for other projects will be summarised.

About the Speaker

After completing his doctorate in theoretical particle physics at Oxford University in 1967, Chris Llewellyn Smith spent a brief period at the Lebedev Institute in Moscow before holding posts at CERN in Geneva and the Stanford Linear Accelerator Centre (SLAC) in California. He returned to Oxford in 1974 where he was Chairman of Physics from 1987–1992, when he led the merger of five separate Departments to create one of the UK's two top rated (5*) Physics Departments.

At the beginning of 1994, Professor Llewellyn Smith returned to CERN to serve as Director-General for five years. During his mandate, CERN's flagship project (LEP) was successfully upgraded and a new project, the Large Hadron Collider (LHC), was approved. When it comes into operation in 2005, the LHC will be the world's premier instrument for exploring the deep structure of matter. Scientists from over 30 non-members States have joined those from CERN's 20 Member States in designing and constructing LHC experiments. During the period 1995-97 agreements were negotiated whereby Canada, India, Israel, Japan, Russia and the

¹**Note:** We have now decided to **KEEP** the **earlier** start time of **7.30 p.m.**; Thanks to all who voted, and sorry to those who wanted to revert to the later time – we hope you will continue to support us, nevertheless

COUNCIL

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Italics denote affiliations other than the University of Cambridge

USA will also contribute to the construction of the new collider itself, making the LHC the first large global scientific construction project.

Professor Llewellyn Smith moved to UCL (University College London) in January 1999, and has been President and Provost of UCL since April 1999. UCL is consistently ranked as one of the UK's leading multi-faculty universities.

Professor Llewellyn Smith's research interests have covered all aspects of theoretical particle physics that are related to possible experiments, including the quark model, the theories of the strong/nuclear and unified electroweak forces, and the possibility of "grand unification" of the forces and "supersymmetry". He has served on the UK's Nuclear Physics Board and the Prime Minister's Advisory Council on Science and Technology, and on advisory bodies at CERN, SLAC and the Deutsches Elektronen Synchrotron (DESY) in Hamburg. He was knighted in 2001 "for services to particle physics".

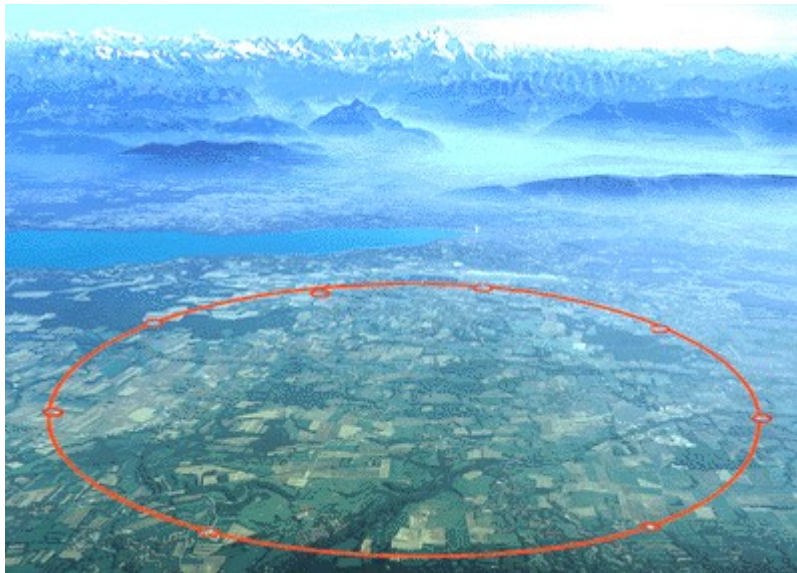
About the Subject (Organising Secretary's notes)

Unusually, I have almost nothing to say about this subject; except that you may expect some Dreadnought grade physics and some super-heavy engineering. Those of you brave enough can find more on the following websites

http://physics.iop.org/Policy/v_production/v6.html (and its parent site, http://physics.iop.org/Policy/v_production/wwwcontents.html is very useful too); <http://www.exploratorium.edu/origins/cern/tools/lhc.html>

It is BIG; see the aerial photograph below; size, it seems really does matter

Richard Freeman
Organising Secretary



HOUSKEEPING NOTE

Our final lecture will be something entirely different:

The World, as seen by Insects by **Professor Simon Laughlin**, Department of Zoology, University of Cambridge, which will take place on June 10th

A little bit of light refreshment, I hope