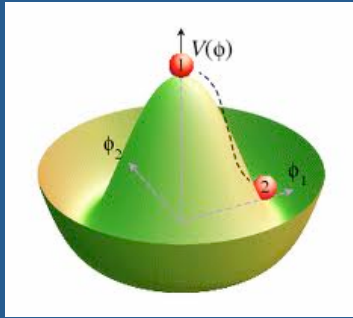


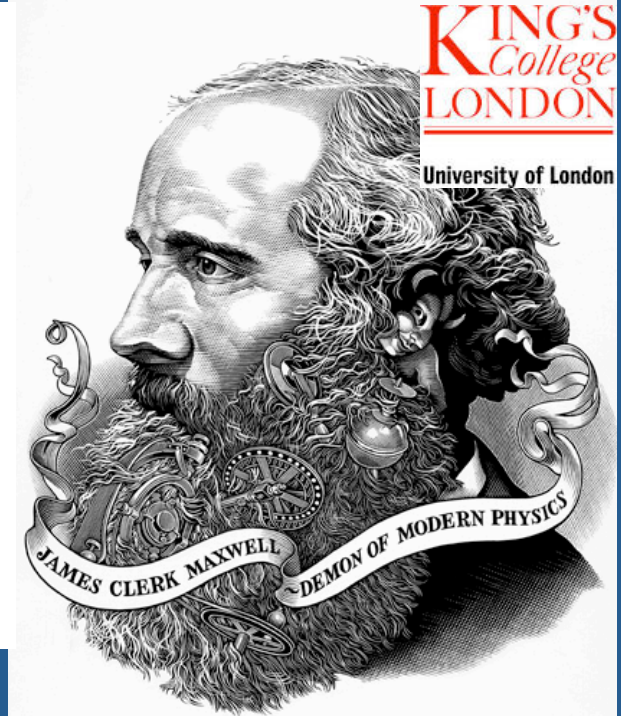
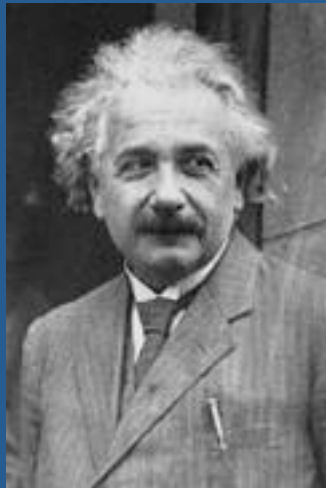
2014: a good year for fundamental physics:

2014: a good year for fundamental physics:

- 150 years since Maxwell equations



$$\begin{aligned}\nabla \vec{E} &= \rho \\ \nabla \times \vec{B} &= \vec{j} + \frac{\partial \vec{E}}{\partial t} \\ \nabla \vec{B} &= 0 \\ \nabla \times \vec{E} &= -\frac{\partial \vec{B}}{\partial t}\end{aligned}$$



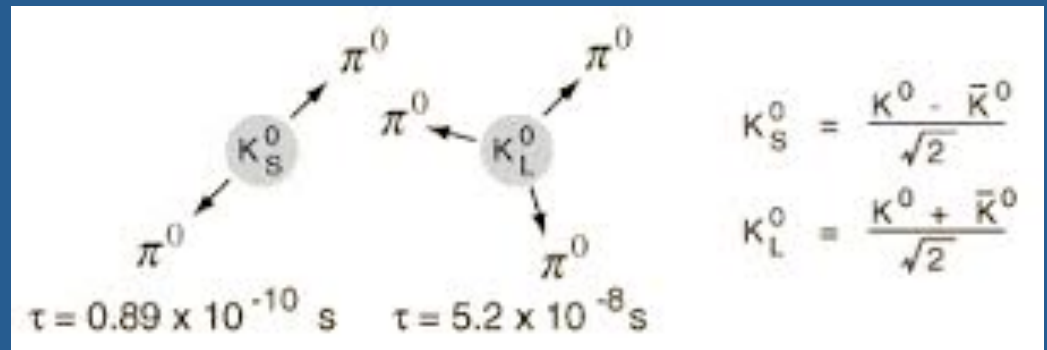
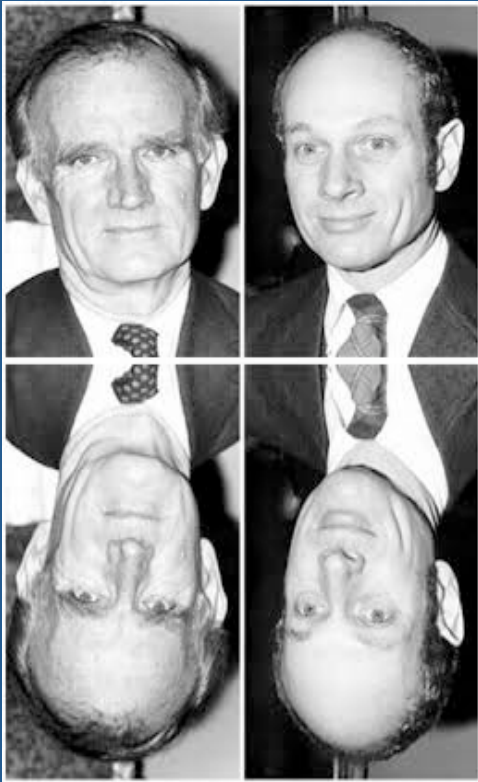
2014: a good year for fundamental physics:

- 60 years of CERN



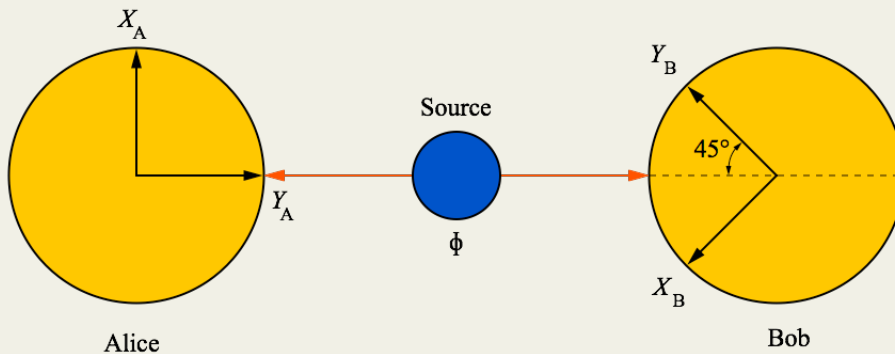
2014: a good year for fundamental physics:

- 50 years of CP Violation



2014: a good year for fundamental physics:

- 50 years of Bell's theorem



2014: a good year for fundamental physics:

- 25 years of WORLD WIDE WEB



Questioning Fundamental Physical Principles

CERN, 6-9 May 2014, Geneva, Switzerland
TH Conference room, Bld.4 - 3rd floor



The discovery of the Higgs Boson at the LHC marks the apotheosis of quantum field theory, but there is no sign of standard BSM physics, leaving many physicists wondering whether the Higgs is all there is. The standard theoretical framework is beset by paradoxes, such as black-hole physics, the problems of measurement and decoherence in quantum theory. These lead some theorists to question the fundamental principles of Lorentz-invariance, the equivalence principle and locality, with possible consequences for CPT Violation and other matter-antimatter differences. The latter could be probed in experiments at CERN and elsewhere, as well as having implications for Early-Universe Cosmology. This workshop will bring together theorists exploring these issues as well as experimentalists confronting their ideas.

Organising committee:

Catalina Curceanu (National Laboratories Frascati)
Antonio Di Domenico (University of Roma Sapienza)
John Ellis (King's College London & CERN)
Beatrix Hiesmayr (University of Vienna)
Johann Marton (Academy of Sciences, Vienna)
Nick E. Mavromatos (King's College London & CERN) - Chair
Sarben Sarkar (King's College London)



<http://indico.cern.ch/event/qfpp14>

funded by:

CERN TH Unit, ERC ADV 267352, COST Action MP1006

QUESTIONING FUNDAMENTAL PHYSICAL PRINCIPLES - CERN 6-9 May 2014, TH Conference Room, Bld.4,3 floor

Tuesday, May 6 th	Wednesday, May 7 th	Thursday, May 8 th	Friday, May 9 th
PLENARY SESSION	PLENARY SESSION	PLENARY SESSION	PLENARY SESSION
<p>9:00 - 10:35 N.E. Mavromatos Welcome</p> <p>J. Ellis (Latest on Supersymmetry, Higgs and LHC Physics)</p> <p>J. Bernabeu (Discrete Symmetries T, CP and CPT)</p> <p>G. Barenboim (CPT and neutrinos)</p>	<p>9:00 - 10:35 K. Olive (Inflation & Supersymmetry)</p> <p>M. Shaposhnikov (Higgs Inflation at the critical point)</p> <p>R. Mohapatra (Testing Baryogenesis at the LHC)</p>	<p>9:00 - 10:45 F. Sciarrino (Boson Sampling via integrated quantum photonics)</p> <p>C. Hogan (Probing the space-time structure: the holometer experiment at Fermilab)</p> <p>M. Genovese (Improving interferometers by quantum light: is possible testing quantum gravity on an Optical bench?)</p>	<p>9:00 - 10:40 G. Shore (Questioning Causality, unitarity and CPT in curved spacetime QFT)</p> <p>J. Pinfold (The continuing quest for the magnetic monopole)</p> <p>S. Liberati (Lorentz Breaking Effective Field Theories: phenomenology and constraints)</p>
coffee break	coffee break	coffee break 10:45 - 11:15	coffee break
<p>11:00 - 13:00 A. Bevan (Experimental prospects for T and CPT symmetries tests in the B meson system)</p> <p>A. Di Domenico (Testing fundamental physical principles with entangled neutral K mesons)</p> <p>G. Passaleva (Fundamental Physics results at LHCb and future perspectives)</p> <p>C. Schwanda (Time-dependent CP violation and stability of the entangled B Bbar state at Belle)</p>	<p>11:00 - 13:00 S. Pascoli (Neutrinos and Leptogenesis in Early Universe)</p> <p>A. Pilaftsis (Flavour and Thermal Effects on Leptogenesis)</p> <p>N. Dadhich (Vacuum energy and Lambda: a new perspective)</p> <p>S. Sarkar (Strings, and CPT Violating Baryon Asymmetry in the Universe)</p>	<p>11:15 - 13:15 E. Widmann (Hyperfine structure of antihydrogen in ASCUSA)</p> <p>R. Hayano (Physics of ASACUSA: the spectroscopy of antiprotonic helium)</p> <p>M. Charlton (Antihydrogen physics with ALPHA)</p> <p>W. Oelert (The ELENA project at CERN)</p>	<p>11:10 - 12:40 C. Laemmerzahl (Tests of fundamental principles)</p> <p>M. Doser (The AEGIS experiment at the CERN antiproton decelerator)</p> <p>V. Mitsou (Experimental status of Supersymmetry)</p> <p>12:40-13:00 Closing session: Jack Steinberger (50 years of CP Violation)</p>
Lunch	Lunch	Lunch	Lunch
<p>14:30 - 16:00 E. Kiritsis (On Lorentz violation and the origin of Gravity)</p> <p>A. De Santis (Test of CPT and Lorentz symmetry with entangled K0's)</p> <p>P. Moskal (Prospects for studies of discrete symmetries with positronium)</p>	<p>14:00 - 15:10 TH-COLLOQUIUM: V. Rubakov (<i>The Null Energy Condition, its violation and creation of a universe in the laboratory</i>)</p> <p>15:10 - 16:40 B. Mukhopadhyay (CPTV leptogenesis)</p> <p>M. Blasone (flavor neutrino states and quantum entanglement)</p> <p>J. Marton (VIP-2 at Gran Sasso - an experiment to test the Pauli Principle for electrons)</p>	<p>14:45 - 16:00 G. Gabrielse (The most precise tests of the standard model and its symmetries)</p> <p>B. Clerbaux (Overview of Physics results at CMS)</p>	
coffee break	coffee break 16:40-17:05	coffee break	coffee break
<p>16:30 - 18:00 X. Lu (Physics with entangled neutral D mesons at BES-III and future perspectives)</p> <p>Y. Shi (Some general results on CP and CPT violating parameters determined from C=-1 and C=+1 entangled states)</p> <p>T. Durt (The possible existence of a Time Operator and its possible refutation in meson experiments)</p>	<p>17:05 - 18:35 A. Bassi (Recent developments in Collapse Models)</p> <p>B.C. Hiesmayr (CP violation and quantum entanglement and possible spontaneous collapses of the wave function)</p> <p>C. Curceanu (X-ray experiments to test collapse models)</p>	<p>16:30 - 18:00 H. Lubatti (Overview of Physics results at ATLAS)</p> <p>Andrzej Kupsc (on dark photon search)</p> <p>E. Milotti (Photon-photon scattering and the nature of QED vacuum: experimental approaches)</p>	

Special Thanks to:

CERN-TH-DIVISION (I. Antoniadis)

ERC ADV 267352 (John Ellis)

COST Action MP1006 (A Bassi, B Hiesmayr)

for financial support

and to

Nanie Perrin (TH Secretariat)

for help with admin/organization

Many thanks
to all of you
for your
participation

Enjoy the
Conference!