



## ICFO Colloquium **MICHAEL BERRY** 'Optical Curl Forces and Beyond'

MICHAEL BERRY

June 03, 2016

12:00 to 13:00

ICFO Auditorium

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Friday, June 3, 12:00, ICFO Auditorium

### **MICHAEL BERRY**

Melville Wills Professor of Physics (Emeritus), University of Bristol.

Michael Berry is a theoretical physicist at the University of Bristol, England. He was elected a fellow of the Royal Society of London in 1982 and knighted in 1996. He is famous for the Berry phase, a phenomenon observed e.g. in quantum mechanics and optics. He specialises in semiclassical physics (asymptotic physics, quantum chaos), applied to wave phenomena in quantum mechanics and other areas such as optics.

A physical example of a force that depends on position but is not derivable from a potential, that is, a nonconservative force with non-zero curl, is the force on a dielectric particle in an optical field. The resulting dynamics need not be Hamiltonian or Lagrangian, yet is

non-dissipative, with unfamiliar chaotic dynamics. Noether's theorem does not apply, so the link between symmetries and conservation laws is broken. Although unambiguous in optics, the physical existence of curl forces has been controversial among engineers. Motion under curl forces near optical vortices can be understood in detail, and the full series of 'superadiabatic' correction forces derived, leading to an exact slow manifold in which fast (internal) and slow (external) motion of the particle is separated. These classical optical forces have quantum effects.

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