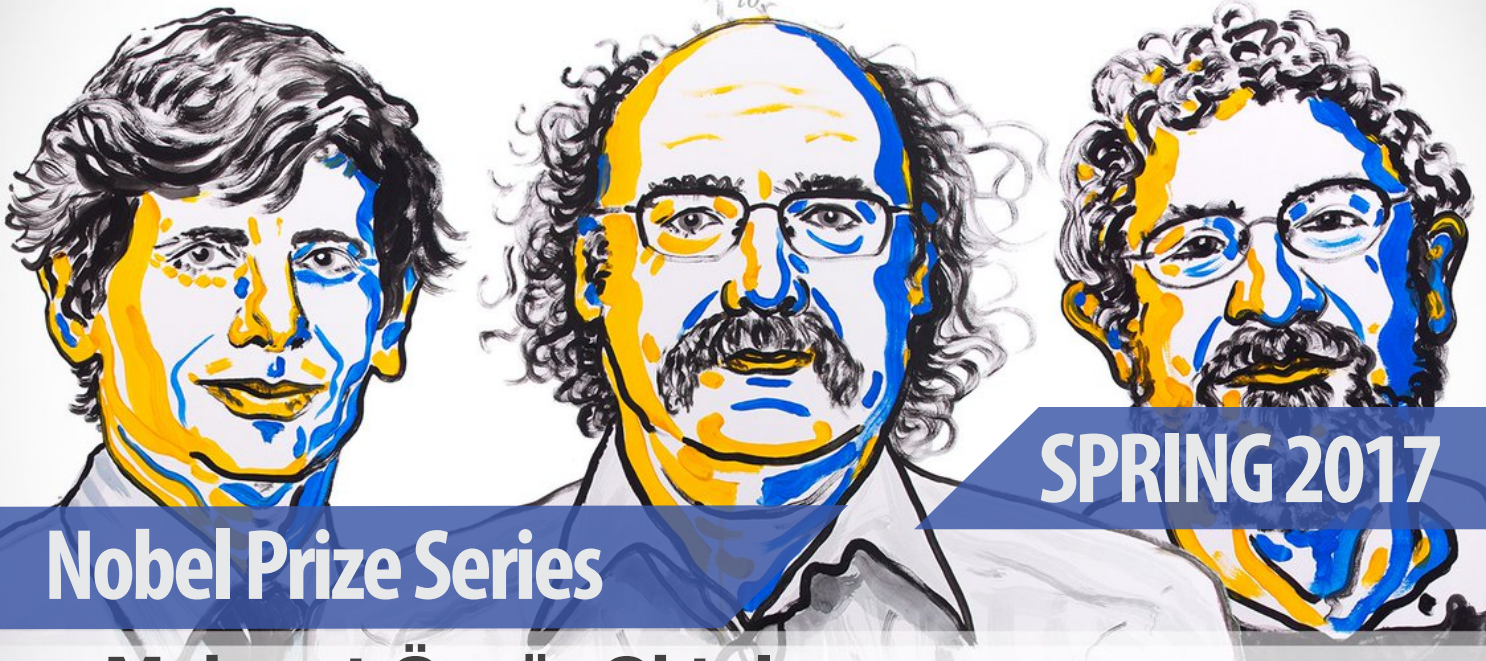


## 2016 NOBEL PRIZE IN PHYSICS



**Mehmet Özgür Oktel**

*Bilkent University, Department of Physics*

Topological Effects in Non-relativistic Quantum Mechanics: An overview of the 2016 Nobel Prize

day

**MAR 1, 2017 WED**

location

**SU-01**

time

**15:40**

### ABSTRACT

The 2016 Nobel Prize in Physics has been awarded to J. Michael Kosterlitz, Duncan Haldane, and David J. Thouless, for “theoretical discoveries of topological phase transitions and topological phases of matter”. In this talk I will try to explain why Topology, a branch of geometry which studies properties which do not change with continuous changes in size or shape, becomes important in determining the physical properties of a system and phase transitions between different states of matter. Without presenting any mathematical details, I will motivate the order parameter concept and its connection to topological defects. I will try to review some of the concepts regarding Kosterlitz Thouless phase transitions, Thouless charge pumps, Thouless-Kohmoto-Nightingale-den Nijs conductance formula, Haldane gap in spin chains and the Haldane model. Finally I would like to review current status of the field, including our recent work[1] The talk is aimed at a broad audience with minimal background in mathematics and physics, and should be accessible to undergraduate students.

[1] F. Nur Ünal, Erich J. Mueller, and M. Ö. Oktel PHYSICAL REVIEW A 94, 053604 (2016) “Nonequilibrium fractional Hall response after a topological quench.”

**Mehmet Özgür Oktel** graduated as the valedictorian from METU in 1996 with a double major degree in Physics and Electrical Engineering. In 2001 he completed his Ph.D. in physics at MIT developing a theory of optical excitations in cold gases. After post doctoral work at the Ohio State university he joined Bilkent Physics department where he is currently an associate professor. He has held visiting positions at Cornell University, USA; Tsinghua University, PRC and Institut Henri Poincaré, France. He has been awarded TUBA-GEBIP, TUBITAK Tesvik and Mustafa Parlar Foundation awards. His research focuses on theoretical aspects of cold atom and condensed matter physics.

The Faculty of Science Seminars are designed to address a non-specialist, broad audience and introduce topics of contemporary research through lectures by leading experts. We warmly invite all members of the student body, including undergraduates enrolled in any programme.