# THURSDAY COLLOQUIUM

## Department of Physics, Tsinghua University

http://info.phys.tsinghua.edu.cn/Colloquium/

## Title A different perspective on the quantum theory of reactions

**Speaker Prof. Bo Gao**

**University of Toledo**

**Venue 清华大学理科楼郑裕彤讲堂**

**&Date 2011年12月22日16:00**

**Abstract：** In conventional quantum theories of reactions, little can be known about a reaction without a detailed knowledge of the potential energy surface (PES), the accuracy of which is often insufficient for quantitative predications. This difficulty, coupled with the exponential growth of the Hilbert space beyond two-body, has limited the conventional theories to a few simple systems such as D+H2, with little hope for more complex systems.

Motivated by a recent landmark experiment by the JILA group, a multichannel quantum-defect theory for reactions (MQDTR) has been developed that offers a substantially different perspective. It asserts that much can be known about a quantum system simply from the types of long-range interactions among its constituents. Whatever not yet known can be characterized by a few energy-insensitive parameters, which can be further determined from a few experimental measurements without any knowledge of the short-range interaction, or even the strength of the long-range interaction. Such a paradigm frees the theory from being held hostage by the details of PES, while ready to take advantage of them when they are available. I will present some initial results of the theory including universal models for exoergic neutral-neutral and charge-neutral reactions, and will explain the origin of such universalities.

## Introduction to the Speaker

**Appointments**

Professor of Physics, University of Toledo, 2007-present
Visiting Scientist, IQOQI, Austria, 3/2010-5/2010
Visiting Scientist, ITAMP, 6/2009-12/2009
Associate Professor of Physics, University of Toledo, 2001-2007
Guest Researcher, NIST, Gaithersburg, 2001-2002
Assistant Professor of Physics, University of Toledo, 1994-2001

**Honors**

Fellow of American Physical Society, 2009
Member of China's One Hundred Talent Program, 2001-2003
Parker Fellowship, Department of Physics, The University of Nebraska-Lincoln, 1989-90
Maude Hammond Fling Graduate Fellow, The University of Nebraska-Lincoln, 1987-88
CUSPEA student, 1983