



Physical Research Laboratory, Ahmedabad

Colloquium 20_07

- Speaker:** Prof. Bobby K Antony
Department of Physics, Indian Institute of Technology (Indian School of Mines), Dhanbad, India
- Title:** “Electron and positron scattering from molecules”
- Date and Time:** Wednesday, 28 October 2020, 16:00 – 17:00 hrs
- YouTube Link:** <https://www.youtube.com/watch?v=HSqGXjVv00U>

Abstract

The study of leptonic collisions with matter is central to understanding many natural phenomena and to the development of many technologies of the 21st century. Furthermore, the fundamental quantum nature of such interactions is such that they are a primary example of modern physics. Despite more than a century since the first quantified experimental study of electron interactions with atoms (The Franck Hertz experiment of 1914) and the first applications of quantum mechanics to model such interactions, our knowledge of the dynamics of such collisions remains incomplete. The increasing recognition of the central role of electron collisions with molecular systems in determining chemical pathways has led to a renaissance in electron – matter interactions with ‘electron induced chemistry’ now being prevalent in industrial (e.g. development of next generation nanolithography) and clinical (next generation radiotherapy) applications.

Whilst the role of electron induced physio-chemical processing is now recognized to be dominant in astrophysics/astrochemistry and from Star formation to planetary atmospheres. Simultaneously our ability to produce high fluxes of positrons has allowed anti-matter to be adopted as a scientific tool, for example, the now commonly deployed Positron Emission Tomography (PET) in the clinic. Positrons are also now widely used in material science. Besides, their role in astrophysics is important in understanding our early universe. However, detailed understanding of positron scattering from atoms and molecules is a difficult task for both theory and experiment due to various known reasons. For example, the formation of positronium (Ps) makes it even more challenging. Our group at IIT (ISM) has developed theoretical methods to study various processes of electron and positron scattering and have predicted cross section for many atoms and molecules.

The Speaker

Prof. Bobby K Antony is a Professor of Physics and Associate Dean (students Activity) at the Indian Institute of Technology (Indian School of Mines) Dhanbad. Prof. Antony did his graduation (1996) and post-graduation (1998) from the University of Calicut, Kerala. He obtained his Ph.D. degree from the Sardar Patel University, Vallabh Vidyanagar in 2005. Prof. Antony was a Commonwealth Research Scholar Under Commonwealth Split-site Scholarship, Association of Commonwealth Universities, the United Kingdom during 2003-2004. Prof. Antony did his Postdoctoral Fellowship at the University of Massachusetts Lowell, USA, during 2005-2007. After returning to India in 2008, he was a visiting fellow at the Tata Institute for Fundamental Research, Mumbai, before joining ISM, Dhanbad, in 2008. Prof. Antony’s research interests are in the Theoretical Atomic and Molecular Physics, and particularly, electron/positron impact collision and ionization of atoms and molecules & photoionization of molecules. Prof. Antony has published more than 110 research papers in peer-reviewed journals and contributed to 6 book chapters. He is a member of several associations and societies such as the Indian Physics Association and the Indian Society of Atomic and Molecular Physics.

ALL ARE WELCOME

