Final Report on the

Science Academies' Refresher Course

on the theme

Applications of Quantum Mechanics: Atoms, Molecules and Radiation

held at Department of Physics, University of Mumbai

(21.12.2015-4.01.2016)

Science Academies' Refresher Course on the theme “Applications of Quantum Mechanics: Atoms, Molecules and Radiation” held at Department of Physics, University of Mumbai from 21.12.2015-4.01.2016. Partial support for the course was provided by the University of Mumbai. The Course Director was Prof. Deepak Dhar, TIFR and the coordinator was Prof. Anuradha Misra (Univ. Mumbai).

The main course consisted of four modules: (1) Basics of quantum Mechanics, (2) Atoms, (3) Interaction of radiation with atoms and (4) Molecules. Each module consisted of 6 lectures of 90 minutes duration. The lecturers for these modules were Prof. V. Balakrishnan (I.I.T.M.), Prof. A. Rangwala (Univ. Mumbai), Prof. N. Mukunda (I. I. Sc.) and Prof. V. Prabhudesai (T.I.F.R.) respectively.

Two special lectures were held on “The Changing Flavours of Neutrinos: Journey to Nobel 2015 and Beyond” by Dr. Amol Dighe, TIFR and “Science Education: An Art or a Science” by Dr. Vijay Singh, HBCSE, TIFR. A Lecture Demonstration on “Computer Interfacing Techniques for experiments and an example - Quantum Analog Experiment” was conducted by Prof. R. Nagarajan, UMDAE-CBS and Dr. Manohar Nyaye, Bandojdkar College, University of Mumbai. Posters with abstracts of all these special events are attached with this report.

In addition to main lectures delivered by the resource persons, another important component of the course were the tutorial sessions, where both the lecturer and the tutor were present to answer any questions from the lectures. Some of the tutorial sessions were devoted to practice in problem solving. Based on the feedback received, and from conversations with participants, we found that the participants found these very useful.

A total of 63 teachers and students attended the course for full duration. These included 38 Academies’ sponsored participants (20 college teachers and 18 research students), 10 unregistered local participants and 15 student volunteers who attended all the lectures, in addition to their work in contribution to organization of the course. A summary and list of participants is attached.

The list of resource persons, detailed outline of courses, the list of participants and the time table are given as separate attachments. The scanned copies of feedback forms filled by participants are also attached. The outline of the course given to the participants before starting the course is also attached.
A half day trip to TIFR was arranged during which participants were taken for a tour of some of the labs of the institute. Another half day was devoted to a tour of Kalina Campus during which the participants were shown the National Center for Nano Science and Nanotechnology, UMDAE-CBS labs and University Department of Physics post-graduate and research labs.

The participants were also asked to make short presentation on topics related to the them of the course chosen by themselves and the presentations were by judges from University Department, HBCSE and UMDAE-CBS. The best three presentations were announced during the Valedictory Function on last day and certificate of appreciation were given to them by the Course Director.

The following books were given to the participants on behalf of the Science Academies:

1. Manjit Kumar: Quantum - Einstein, Bohr and the great debate about the nature of physical reality,

In a nutshell, there was intense intellectual activity for the full duration of the course and looking at the participants’ response inside and outside the class room as well as on the basis of oral and written feedback, we feel that the participants went back richer in terms of knowledge of the subject, motivation, teaching skills and last but not the least inspiration and enthusiasm. The participants expressed interest in participating in more such courses in future.

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