

Quantum Fest 2015

Preface

The *Quantum Fest* is a periodic annual festival on Quantum Phenomena, Quantum Control and Geometry of Quantum States, organized by the Center for Research and Advanced Studies (Cinvestav by its acronym in Spanish) and Unidad Profesional Interdisciplinaria en Ingeniería y Tecnologías Avanzadas del I.P.N. (UPIITA-IPN) in México City, Mexico. The aim of this meeting is to bring together students and researchers which are engaged in the subjects of the festival, from both theoretical and experimental approaches, in order to get lively discussions and to enable a closer contact between them.

The festival was celebrated for the first time in the Physics Department of Cinvestav (2010), since then it has been alternatively hosted in Cinvestav and UPIITA. This is the sixth *Quantum Fest* and the first time that it is formally hosted in the Tecnológico de Monterrey (ITESM).

The *Quantum Fest 2015* took place from October 19 to 23 in *Aulas VI* of the Tecnológico de Monterrey, Campus Estado de México (CEM). We would like to thank the willing of the ITESM-CEM to offer its facilities as the venue of the festival; all its help provided to simplify the logistics and organization of the conference has been welcomed and is acknowledged.

This volume is dedicated to the memory of our dear friend and colleague Sujeev Wickramasekara who passed away suddenly on December 28th 2015 at the age 48. Sujeev participated several times in the festival, he was an excellent speaker and, as a part of the audience, he used to pay special attention to the students' presentations. His comments were always addressed to improve the students' work, so that Sujeev was very popular among the young participants of the festival. We lost not only a great colleague and promissory scientist, but also a beautiful person who we shall always remember.

Professor Manuel Gadella kindly agreed to write the tribute to Sujeev Wickramasekara. The obituary is included in these Proceedings as the opening article.

The topics addressed at the short courses of the *Quantum Fest 2015* were geometry of quantum states, quantum entanglement, fractional calculus with applications in physics (mainly in optics), operator theory of evolution equations and quantum optics.

The Lecturers of Quantum Fest 2015 were:

Karol Życzkowski (Jagiellonian University, Kraków, Poland)

Karol Penson (Sorbonne Universités, Université Paris VI, LPTMC, France)

Vladimir I. Man'ko (Lebedev Physical Institute, Moscow, Russia)

Julio C. Gutiérrez-Vega (Tecnológico de Monterrey, Campus Monterrey, México)



Besides the courses lectured by Profs. Życzkowski, Penson and Gutiérrez-Vega, there were 11 plenary presentations, 12 contributed talks and 25 posters. This time, 48 participants from Tecnológico de Monterrey, Instituto Politécnico Nacional, Cinvestav, and Universidad Nacional Autónoma de México came together to attend the courses, talks and poster sessions delivered during the festival.

We would like to mention that the plenary as well as the contribution talks are presented only by invitation of the festival Organizing Committee.

The Plenary Speakers of Quantum Fest 2015 were:

Mauricio Carbajal (Physics Department, Cinvestav, México)

Octavio Castaños (ICN-UNAM, México)

David Fernández (Physics Department, Cinvestav, México)

Eduardo Gómez (Instituto de Física, UASLP, México)

Véronique Hussin (Department of Mathematics, University of Montréal, Canada)

Rocío Jáuregui (IF-UNAM, México)

Máximo López-López (Physics Department, Cinvestav, México)

Margarita A. Man'ko (Lebedev Physical Institute, Moscow, Russia)

Bogdan Mielnik (Physics Department, Cinvestav, México)

José Récamier (ICF-UNAM, México)

Eric Rowell (Department of Mathematics, Texas A& M University, USA)

Sujeev Wickramasekara (Department of Physics and Astronomy, The University of Iowa, USA)

Unfortunately, the participation of Profs. M. Mank'o and V.I. Mank'o was canceled due to unexpected drawbacks. Nonetheless, they submitted a contribution for the proceedings of the conference, the one that we are happy to include in this volume.

The informal and lively discussions at *Aulas VI* of Tecnológico de Monterrey, CEM, during either the coffee breaks or the poster sessions, have been a breeding ground for scientific collaboration between the participants of the conference. We are certain that this is crucial to strength the rapprochement between students and researchers.

The best poster expositor, M.Sc. Zurika Blanco-Garcia, was the recipient of an academic recognition and received the book *Geometry of Quantum States. An Introduction to Quantum Entanglement* of I. Bengtsson and K. Życzkowski, autographed by Prof. Życzkowski, as a gift from the organizers. The figure in the cover of this volume has been borrowed from the cartel presented by Miss Blanco-Garcia.

The members of the 2015 Organizing Committee were:

Sara Cruz y Cruz (UPIITA-IPN)

Francisco Delgado (Tecnológico de Monterrey, CEM)

Oscar Rosas-Ortiz (Physics Department, Cinvestav)

The *Quantum Fest 2015* would not have been possible without the valuable financial support of the sponsor institutions: Cinvestav and UPIITA-IPN.

Our thanks to M.Sc. Rubén Santiago, *Director del Departamento de Física y Matemáticas*, and to the academic authorities of Tecnológico de Monterrey, Campus Estado de México, for endless support and host during the festival.

Special thanks to Mmes Miriam Lomelí, Maribel de la Cruz and Mónica Otero, Secretaries of the festival, for invaluable help in many aspects of the organization, including the design of the posters and distribution of announcements, hotel and flight reservations, and the scheduling of the event. Miriam, Maribel and Mónica: the *Bar Quantum* is very grateful to you.

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The present volume includes only the positively refereed contributions that were submitted by the participants of the festival.

Finally, we would like to announce that the seventh *Quantum Fest* will take place in the facilities of Unidad Profesional Interdisciplinaria en Ingeniería y Tecnologías Avanzadas del I.P.N., México City, during the third week of October 2016.

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