In Memoriam: Sujeev Wickramasekara (1967-2015)

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Abstract. This is an obituary in Memoriam of Sujeev Wickramasekara who died suddenly on December 28th 2015.

Sujeev Wickramasekara 1967-2015

Sujeev Wickramasekara passed away suddenly on December 28th 2015 at the age 48. He was an excellent scientist with widespread knowledge in the fields of theoretical and mathematical physics. He was a young spirit, hard working and passionate physicist and mathematician; great teacher, highly devoted to his students; and above all an outstanding human being. He had novel and interesting ideas in his field of research, some of which were being developed at the time of his unexpected death.

Sujeev was born in Colombo (Sri Lanka) on September 3rd, 1967. He is survived by his wife, Tammy Nyden, his step sons, Cole and Jonah, his parents Walter Keerthiraja Wickramasekara and Gurukande Wedaarachchige Chandrani, his sister Chamindi and his brother Neshan.

After completing his secondary studies at the Royal College in Colombo, he went to the USA. He earned his Bachelors degree in physics (Summa Cum Laude) at the University of Southern California. Then, he moved to Austin (Texas), where he completed his Ph. D. under Professor Arno Bohm. During this period, Sujeev published 15 scientific papers in leading journals.

After teaching as the Wiess Professor of Physics and Astronomy at Rice University (Texas) and as an Assistant Professor at St. Olaf College (Minnesota), he received a permanent position at Grinnell College (Iowa) in 2005, where he received tenure in 2010 and earned a Full Professorship in 2015. At Grinnell, he displayed a tremendous range from challenging majors with advanced seminars in quantum theory, to teaching sections of general physics and tutorials on the growth and convergence of scientific knowledge and "The Isolation and Connectedness of Human Life". He was a supportive and thoughtful colleague and mentor to his peers and a generation of students.

In addition, Sujeev had a permanent collaboration with the Math-Phys groups of the University of Iowa in Iowa City and the University of Valladolid in Spain. He was a winner of the prestigious Cottrell College Science Award and the Harris Faculty Fellowship.

Among his non-scientific personal interest, he had a personal taste for classical music, in particular the choral works of Schubert and Beethoven, as well as poetry and literature. Above of all, he had a particular dedication to family life. He was an excellent husband and a great step father.

This rings us to the qualities of Sujeev as human being. He was a great friend of all his scientific collaborators, always ready to help others in all aspects of life, either professional or personal. I have witnessed his dedication and patience with students. Sujeev was a great loss for all of us who had the great fortune to know him.

As mentioned earlier, Sujeev earned his Ph.D. at the University of Texas at Austin. He started with some studies on the applications of the de Sitter group $SO(3,2)$ as a spectrum generating group. Then, the application of these ideas in the study of internal symmetries on a model for hadrons [1].

The main subject of his dissertation dealt with semigroup representations of the Poincaré group and their applications to the quantum theory of decay of relativistic unstable particles. This came after a collaboration with his adviser A. Bohm and his fellow graduate students Nathan Harshman and Hani Kaldass [2–7].

At the same time, he also began with one of his deepest scientific interests: the Einstein theory of relativity and its consequences [8].

Sujeev scientific quest covered a variety of subjects. With Nathan Harshman, he explored the intricacies of several aspects of quantum entanglement and their consequences in the theory of quantum information [9, 10]. At the same time, he continued with his analysis of quantum symmetries [11–13], in particular those induced by the Poincaré group [14] as well as on the consequences of representations of Poincaré semigroups in the theory of decay of relativistic particles [15–18]. He also worked in black hole thermodynamics [19].

His concerns about the very fundamentals of quantum physics drove him to an investigation of the result of changes, either inertial or not, of reference systems in quantum physics. I like to believe that these concerns are a result of both, classroom thoughts shared with advanced students and his own experience with symmetry transformations in quantum mechanics, through group theory and group representations. This idea came after the consideration of some of his publications [12–14, 20, 21].

During the last few years and with the collaboration of WH Klink, he was investigating how the same quantum phenomena may look like for different observers which are accelerated with respect to each other. This implies the use of non-inertial transformations of reference frames. Furthermore, this can be seen from three different points of view. In the former, one considers inertial transformations governed by the Galilei group. This yields to the usual non-relativistic quantum mechanics. In this case, a rather general set of non-inertial transformations is governed by the so called Galilei line group. This is a non-trivial generalization of the Galilei group and has an infinite countable number of generators that form a Kac-Moody algebra. Central extensions of the Galilei line group with physical meaning make sense as *loops*, which are a generalization of groups in which the associativity condition has been dropped [22, 23]. It is quite interesting to see that, from the perspective of quantum dynamics, non-inertial transformations may produce additional terms in the Hamiltonian of a single particle, which are not obtained by the canonical quantization of equivalent classical transformations [22–25].

The second point of view was to extend the above analysis to special relativity using the Poincaré group instead of the Galilei group. The third one, was even more ambitious as it included curved space-time, and extending the work to general relativity using the de Sitter group. In some sense, this last step would have been an attempt towards a study of quantum gravity.

In addition to these projects, Sujeev was writing a book, with other authors, on the mathematical foundations of quantum decaying systems and continuing his research in quantum decaying states.

Sujeev was not only an active collaborator with the groups in Iowa City or Valladolid. He

also was an active participant in the Quantum Fest organized each year in Mexico City. In fact, his talk in 2015 was his last one to an international scientific meeting. His contribution appears in this volume.

I wish to emphasize that the list of references below is far from being complete. Among his scientific collaborators, let me mention the following (I hope the list be essentially complete): A Bohm, BK Button, V Colussi, M Gadella, F Gómez-Cubillo, A Guneratne, H Kaldass, P Kielanowski, WH Klink, BR MacGregor, AE McCoy, W Mogavero, NL Harshman, HT Reich, L Rodríguez and T Yildirim.

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References

[1] Wickramasekara S 1997 *Int. J. Theor. Phys.* **36** 2409
[2] Bohm A, Harshman NL, Kaldass H and Wickramasekara S 2000 *Europ. J. Phys* **18** 333
[3] Bohm A, Harshman NL, Wickramasekara S and Kielanowski P 2000 *Phys. Lett.* A **264** 425
[4] Bohm A, Kaldass H and Wickramasekara S 2003 *Fort. Phys.* **51** 569
[5] Bohm A, Kaldass H and Wickramasekara S 2003 *Fort. Phys.* **51** 604
[6] Wickramasekara S and Bohm A 2003 *J. Math. Phys.* **44** 930
[7] Bohm A, Kielanowski P and Wickramasekara S 2006 *Ann. Phys.* **321** 2299
[8] Wickramasekara S 2001 *Class. Quant. Grav.* **18** 5353
[9] Harshman NL and Wickramasekara S 2007 *Phys. Rev. Lett.* **98** 080406
[10] Harshman NL and Wickramasekara S 2007 *Open Sys. Inf. Dyn.* **14** 3421
[11] Wickramasekara S 2009 *Ann. Phys.* **324** 2506
[12] Colussi V, Reich HT and Wickramasekara S 2009 *Ann. Phys.* **324** 2490
[13] Colussi V and Wickramasekara S 2008 *Ann. Phys.* **323** 3020
[14] Riech HT and Wickramasekara S 2010 *Ann. Phys.* **325** 1081
[15] Wickramasekara S 2009 *J. Math. Phys.* **50** 042305
[16] Wickramasekara S 2009 *J. Math. Phys.* **50** 072302
[17] Wickramasekara S and Harshman NL 2009 *Rep. Math. Phys.* **64** 123
[18] Gadella M, Gómez-Cubillo F, Rodríguez L and Wickramasekara S 2013 *J. Math. Phys.* **54** 072303
[19] Button BK, Rodríguez L and Wickramasekara S 2013 *J. High Ener. Phys.* **10** 144
[20] Mogavero W and Wickramasekara S 2011 *Int. J. Theor. Phys.* **50** 2278
[21] MacGregor BR, McCoy AE and Wickramasekara S 2012 *Ann. Phys.* **327** 2310
[22] Klink WH and Wickramasekara S 2015 *Relativity, Symmetry and the Structure of Quantum Theory I. Galilean quantum theory* (Bristol, IOP Concise Physics)
[23] Klink WH and Wickramasekara S 2013 *Ann. Phys.* **336** 261
[24] Klink WH and Wickramasekara S 2013 *Phys. Rev. Lett.* **111** 160404
[25] Klink WH and Wickramasekara S 2014 *Ann. Phys.* **340** 94