

## Quantum Mechanics in Phase Space:



### Constructing New Observables for Quantum Tomography and Entanglement

Professor Demosthenes Ellinas  
Technical University of Crete, Chania, Greece

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#### ABSTRACT:

The area of quantum mechanics in phase space constitutes a methodology for studying quantum phenomena within the classical domain of mechanical position and momentum variables, by means of quasi-probability functions such as the most well-known one, the Wigner function.

The phase space treated as sample space provides the setting for defining observable quantities determined by various phase space regions by means of operators. Examples of constructing novel observable operators and cases of their applications to the Radon tomography of the Wigner function, and to novel forms of quantum entanglement in phase space, will be presented.

#### SPEAKER PROFILE:

Demosthenes Ellinas graduated from Zanneion Experimental School in Piraeus and did his undergraduate studies in Physics at the University of Patras, Greece. He continued postgraduate studies at the International School of Advance Studies (SISSA), in Trieste and at the University of Helsinki, from where he obtained his PhD degree in Theoretical Physics in 1990. His research and teaching experience includes positions at the Research Center for Theoretical Physics in Finland, the University of Helsinki, the Vaasa Institute of Technology in Finland, the University of Valencia in Spain, the University of Crete, the Technical University of Crete (TUC) and the Athens University of Economics and Business in Greece. He holds the position of Professor of Mathematical Physics at the Technical University of Crete. Professor Ellinas is currently group leader of MFQ, a research unit on Mathematical Physics and Quantum Information Science at TUC. His research interests include quantum computation and quantum information, Lie algebras, Lie groups, quantum groups, Hopf algebras and their applications in physics and biology, and theoretical quantum optics and the foundations of quantum theory. His published works have received about 600 (no self) citations.

Professor Ellinas has been visiting scientist in a number of places, including Oxford University, the University of Helsinki, the Technical University of Denmark, the University of Queensland, Macquire University and currently the University of Tasmania.