

CURRICULUM VITAE

of Dr Miroljub M. Dugić, PhD

1. Personal data

Name: Miroljub M. Dugić

Date of birth: 18. VI. 1961.

Place of birth: Kragujevac, Serbia (then Yugoslavia)

Sex: male

Marital status: married

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2. Academic degrees

Year	Degree	Institution	Place	Subject
1997	Ph. D.	Dept. of Physics, Faculty of Science, Kragujevac, Serbia	Kragujevac, Serbia	Quantum theoretical physics
1993	M. Sc.	Faculty of Physics, Belgrade, Serbia	Belgrade, Serbia	Theoretical physics
1985	B. Sc.	Dept. of Physics, Faculty of Science, Kragujevac, Serbia	Kragujevac, Serbia	Physics

3. Professional background

Period	Position	Institution	Place
2011 – present	Full Professor	Faculty of Science, Kragujevac, Serbia	Kragujevac, Serbia
2004 – 2011	Associate Professor	Faculty of Science, Kragujevac, Serbia	Kragujevac, Serbia
1998 – 2004	Assistant Professor	Faculty of Science, Kragujevac, Serbia	Kragujevac, Serbia
1986 – 1997	Teaching Assistant	Faculty of Science, Kragujevac, Serbia	Kragujevac, Serbia

4. Research interests

Foundations of quantum theory and applications. Open quantum systems, Decoherence, Quantum information.

4.1. **Quantum measurement and decoherence.** The problem of measurement—different formulations and aspects, including interpretations. The role of decoherence in the context of quantum measurement.

4.2. **Quantum information.** Fundamental role of quantum information in relation to the puzzling non-classical correlations in quantum systems (entanglement and discord). The status of the measurement problem in the quantum information science context.

4.3 **Dynamics of mesoscopic systems.** Fundamental as well as operational limits of application of the quantum-mechanical versus the classical-physics theories and formalism—the so-called problem of the transition from quantum to classical. Investigation of quantum corrections to the dynamics of certain realistic nanosetups, such as the macromolecular propeller-like cogwheels.

4.4 **Quantum origin of physical Time.** Unitary quantum dynamics offers a unique background for a totally new view of the very concept of Time in physics. Thence a new paradigm of emergent time as a local (single) system characteristic.

Mathematical foundations are laid. A gross effort in the physical domain remains yet.

4.5 **Open quantum systems.** General mathematical and conceptual

background (divisibility, differentiability, complete positivity, Markovianity etc. of the so-called quantum dynamical maps). Different fundamental backgrounds for effective non-unitary dynamics (necessarily tackling the interpretational issues and alternative formulations of quantum mechanics). Diverse applications, mainly for molecular cogwheels topics.

4.6 Quantum interpretations. Reasoning that links all the above-mentioned topics going to diverse directions, e.g. to a flaw of the Everett Many Worlds Theory, to the conceptual background of the very concept of statistical ensemble (generally, not only in physics), deterministic versus stochastic (fundamental) dynamics, the concept of emergent local time (and quantum individuation) and many more.

5. Books

Decoherence in the classical limit of quantum mechanics. A monograph in Serbian (Institute of Physics and Serbian Physical Society, Belgrade, Serbia, 2004).

Quantum Information and Quantum Computation. A monograph/textbook, in Serbian, Faculty of Science, University of Kragujevac, Kragujevac, Serbia 2009).

Quantum Structures. A View of the Quantum World, with Jasmina Jeknic-Dugic and Momir Arsenijevic, Lambert Academic Publisher, Saarbrucken, Germany, 2013.

Problem Book in Open Quantum Systems Theory, in Serbian, with Jasmina Jeknic-Dugic and Momir Arsenijevic, Faculty of Science and Mathematics, Nis, Serbia (in press, 2024).

Axiomatic Quantum Mechanics, a textbook in Serbian, with Jasmina Jeknic-Dugic, in final preparation (2024).

6. Selected publications in the scientific research journals

J. Jeknic-Dugic, M. Arsenijevic, M. Dugic, On existence of quantum trajectories for the linear deterministic processes, Int. J. Theor. Phys. 63 , 69 (2024)
J. Jeknic-Dugic, M. Arsenijevic, M. Dugic, Invertibility as a witness of Markovianity of the quantum dynamical maps, Braz. J. Phys 53 , 58 (2023)

I. Petrovic, J. Jeknic-Dugic, M. Arsenijevic, <u>M. Dugic</u> , Dynamical stability of the weakly nonharmonic propeller-shaped planar Brownian rotator, Phys. Rev. E 101 , 012105 (2020)
M. Arsenijevic, J. Jeknic-Dugic, <u>M. Dugic</u> , Complete positivity on the subsystems level, Int. J. Theor. Phys. , 57 , 3492 (2018)
Jasmina Jeknic-Dugic, Igor Petrovic, Momir Arsenijevic, <u>Miroljub Dugic</u> , Dynamical stability of the one-dimensional rigid Brownian rotator: The role of the rotator's spatial size and shape, J. Phys.: Condens. Matter 30 , 195304 (2018)
Hitoshi Kitada, Jasmina Jeknic-Dugic, Momir Arsenijevic, <u>Miroljub Dugic</u> , A minimalist approach to conceptualization of time in quantum theory, Phys. Lett. A 380 , 3970 (2016)
J. Jeknic-Dugic, M. Arsenijevic, <u>M. Dugic</u> , Dynamical emergence of Markovianity in Local Time Scheme, Proc. R. Soc. A 472 : 20160041 (2016)
J. Jeknić-Dugić, M. Arsenijević, <u>M. Dugić</u> , “A local-time-induced unique pointer basis”, Proc. R. Soc. A. 470 , 20140283 (2014)
J. Jeknić-Dugić, <u>M. Dugić</u> , A. Francom, “Quantum Structures of a Model-Universe: An Inconsistency with Everett Interpretation of Quantum Mechanics”, Int. J. Theor. Phys. 53 , 169 (2014)
<u>M. Dugić</u> , M. Arsenijević, J. Jeknić-Dugić, Quantum Correlations Relativity for Continuous-Variables Bipartite Systems, Sci. Chi. PMA 56 , 732 (2013)
M. Arsenijević, J. Jeknić-Dugić and <u>M. Dugić</u> , Chin. Phys. B 22 , 020302 (2013)
<u>M. Dugić</u> , J. Jeknić-Dugić, What is “system”: The information-theoretic arguments, Int. J. Theoret. Phys. 47 , 805 (2008)
J. Jeknić-Dugić, <u>M. Dugić</u> , Quantum Locality for a Pair of Interacting Systems, Chin. Phys. Lett. 26 , 090306 (2009)
J. Jeknić-Dugić and M. Dugić, Multiple System-Decomposition Method for Avoiding Quantum Decoherence, Chin. Phys. Lett. 25 , 371 (2009)
J. Jeknić, <u>M. Dugić</u> , D. Raković, A unified decoherence-based model of microparticles in a solution, Materials Science Forum 555 , 405 (2007)
<u>M. Dugić</u> , J. Jeknić, Int. J. Theoret, Phys. 45 , 2215 (2006)
B. Dragovich and <u>M. Dugić</u> , On decoherence in noncommutative plane with perpendicular magnetic field, J. Phys. A: Math. Gen. 38 , 6603 (2005)
<u>M. Dugić</u> , Decoherence due to internal mesoscopic environment: a possible experimental test, Europ. Phys. Journal D 29 , 173 (2004)

M. Dugić, Quantum entanglement suppression, *Europhys. Lett.* **60**, 7 (2002)

M. Dugić and M. M. Ćirković, Quantum information processing: the case of vanishing interaction energy, *Phys. Lett. A* **302**, 291 (2002)

M. Dugić and D. Raković, Quantum-mechanical tunneling in associative neural networks, *Europ. Phys. J. B* **13**, 781 (2000)

M. Dugić, Comment on “Quantum mechanical description of thermal equilibrium states as eigenstates of relative-phase interactions” by Kobayashi, *Phys. Lett. A* **235**, 200 (1997)

Reviewing. Served as a referee for *New Journal of Physics*, *Foundations of Physics(Letters)*, *Quantum Information and Computation*, *International Journal for Theoretical Physics*, *Journal of Optical Society of America B*, *Journal of Physics A*, *EPJ Quantum technology*, *Physica Scripta*, *Scientific Reports*, *Journal of Information Technology and Applications*, *npj Quantum information* and many other less known scientific journals.

8. Teaching experience

Undergraduate (Faculty of Science in Kragujevac): Statistical Physics, Quantum mechanics, Quantum information and computation, Quantum field theory, Symmetries in physics, General course of physics for medicine; **PhD studies** (Faculty of Science in Kragujevac, Faculty of electrical engineering in Belgrade and at Faculty of Science and Mathematics in Nis): Quantum decoherence theory, Theory of open quantum systems, Quantum-mechanical foundations of modern cosmology, Quantum information and computation, Quantum bioinformatics.