South African Quantum Technology Initiative

NITheCS
National Institute for Theoretical and Computational Sciences

International Year of Quantum Science and Technology

SEMINAR

Remarks on the Use and Properties of Matrix Continued Fractions in Quantum Physics

Prof Miloslav Znojil

(Durban University of Technology & University of Hradec Králové, Czech Republic)

Friday, 27 June 2025 @ 14h00-15h00 SAST

Venues: Online and Physics Seminar Room, Stellenbosch University

ABSTRACT

With resonances treated as eigenstates of a non-Hermitian quantum Hamiltonian, the typically challenging task of localising its complex energy eigenvalues is proposed to be replaced by (a simpler task of) localising the real quantities called singular values. Under suitable constraints (including the tridiagonality of Hamiltonian) the singular values are specified as poles of a Hermitized Green's function expressed in terms of one or two matrix continued fractions (MCFs). Detailed attention will be paid to the criteria and speed of the MCF convergence. Multiple examples (including, i.a., the multi-bosonic Bose-Hubbard-like systems) will be recalled for illustration purposes.

BIOGRAPHY

Prof Miloslav Znojil is a Czech theoretical and mathematical physicist specialising in quantum mechanics, with a focus on simplified and tractable models, pseudo-Hermitian operators, and advanced algebraic and analytical methods. He earned his BSc in Nuclear Physics from the Czech Technical University (1968), followed by MSc and PhD degrees in Theoretical and Mathematical Physics from Charles University, Prague, where he was later awarded the prestigious Dr.Sc. scientific degree in 1994. Prof Znojil has held research positions across Europe and Russia, including at the Institute of Nuclear Physics (CSAS, Rez), the J. Stefan Institute (Ljubljana), and FIAN Moscow. He currently serves as a Leading Research Worker at the Nuclear Physics Institute of the Czech Academy of Sciences, a Research Professor at Durban University of Technology, and an independent researcher at the University of Hradec Králové.

He is Deputy Director of the Doppler Institute (Rez branch) and sits on the editorial boards of *Physics* and *Acta Polytechnica*. He has authored over 325 publications with more than 5,800 citations (h-index: 38), and is recognised internationally for his contributions to quasi-Hermitian quantum models, perturbation theory, and supersymmetry.

REGISTER: https://bit.ly/4kMvxIM

QSUN Quantum Research Group of Stellenbosch University

Stellenbosch University
IYUNIVESITHI
UNIVERSITEIT