**NITheCS and the Department of Physics at Stellenbosch University jointly present a**
# COLLOQUIUM:
# Quantum Simulation of Open Quantum Systems
## Prof Ilya Sinayskiy (University of KwaZulu-Natal)

## Attend in person or online
**Venue:** Lecture Hall Delta (1011), Merensky Building (Physics Department), Stellenbosch University

## Friday, 23 September 2022 | 14h30 – 15h30 SAST

## ABSTRACT

At the beginning of 1980th, Feynmann and Manin suggested using carefully controlled quantum systems to simulate the evolution of other (more complex) quantum systems. In 1996 Seth Lloyd demonstrated a way to perform the quantum simulation of an arbitrary unitary evolution.

Over the last 25 years, the field of quantum simulation has grown dramatically, branching to digital and analogue simulators, quantum simulators on fault-tolerant error-correcting quantum computers (which do not exist at present) and noisy intermediate-scale quantum devices (NISQ, which exists currently or will be available in the five years).

I will introduce basic concepts and approaches to quantum simulation in this talk. I will briefly cover our contribution to the quantum simulation of open quantum systems in fault-tolerant and NISQ settings.

## BIOGRAPHY

Ilya Sinayskiy was born in 1981 in Smolensk, USSR (currently Russian Federation). In 2003 and 2007, he obtained his diploma in physics (MSc) and a candidate of science degree (PhD) from Samara State University.

Prof Sinayskiy joined the Quantum Research Group, led by Prof Francesco Petruccione (SU), in January 2008. A year later, he was appointed as a researcher at the National Institute for Theoretical Physics (NITheP). He joined the permanent staff at the School of Chemistry and Physics at the University of KwaZulu-Natal in 2016.

His research interests are related to the theory of Open Quantum Systems, with application in Quantum Information Theory, Quantum Computing, Quantum Thermodynamics, Quantum Biology, and Quantum and Classical Machine Learning.

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