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Division of Theoretical Physics IPPAS

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Quantum Dynamics II

- **Time & Location**: Wednesdays at 10:00, room 15/XV, Institute of Physics PAS (al. Lotników 32/46).
- **Online access:** VoD recordings on YouTube youtube.com/@theoryIFPAN
- **Duration:** 10 sessions, each 3 hours (30 hours in total)
- **First Lecture:** October 7th.
- **Lecturer**: Dr Piotr Szańkowski (piotr.szankowski@ifpan.edu.pl)
- **Reading Materials**: Available on the course website.
- **Language**: English
- **Website**: https://theory.ifpan.edu.pl?class=25/2/qdyn/pszan

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ABOUT:

This is the direct continuation of the first part of the course Quantum Dynamics.

The course offers an overview of theoretical approaches to the description of *quantum dynamics,* from the basic exponential map generated by the system's Hamiltonian, to the adiabatic theorem, and Green's function methods. Our focus will be on a perturbation-theoretical approach—the likes of the Schrieffer–Wolff transformation and the Magnus expansion—that reveals the underlying structures of quantum dynamical laws, rather than on numerical methods meant only for efficient computation. Hence, the course will lean more toward the formalistic and mathematical side, but not overly so.

COURSE STRUCTURE

I. **Part I** (previous semester)
- I.1. Introduction to Quantum Dynamics
- I.2. Evolution operator
- I.3. Schrieffer–Wolff transformation

II. **Part II** (this semester)
- II.1. Magnus expansion
- II.2. Adiabatic theorem and other asymptotic perturbation theories
- II.3. Green function methods