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DDES - DUT Differential Equations Seminar
Seminar Room 114
9:00am - 9:45am, Thursday, Mar 26, 2026

From the Schrödinger and Klein–Gordon equation to the Dirac equation

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Abstract. Both the Schrödinger and the Klein–Gordon equation from quantum mechanics are derived from energy-momentum relations, non-relativistic for the former and relativistic for the latter. Both are also mathematically interesting as they are closely related to the heat and wave equation, respectively. But going deeper into quantum field theory requires more structure, mainly to properly describe the spin of particles. A suitable mathematical method is provided by Dirac operators, which when applied twice yield a generalized Laplace operator. Dirac operators then not only lead to the Dirac equation, which predicted antimatter, but also to rich mathematical applications, for example in combination with the famous Atiyah–Singer index theorem.

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- **2025 – Present:** PhD Student in Mathematics, Dalian University of Technology, China.
- **2021 – 2025:** M.Sc. in Mathematics, University of Augsburg, Germany.
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Research Interests:
Differential Geometry, (Higher) Category Theory, (Relativistic) Quantum Field Theory, General Relaticity.