MATH 4810/5810 Hilbert Spaces
Course Projects

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1. Algebraic quantum mechanics
2. L^p-spaces
3. The Theorem of Stone–Weierstraß
4. The Stern–Gerlach experiment
5. The experiments by Alain Aspect et al. which confirmed Bohr's interpretation of quantum mechanics
6. Representations of the Lie algebra $\mathfrak{su}(2,\mathbb{C})$
7. Coherent states
8. Wigner's theorem
9. Bargmann's theorem
10. The EPR paradox and Bell's inequality
11. Quantum Logic from a mathematical point of view
12. Pauli's derivation of the spectrum of the hydrogen atom
13. Fourier analysis in Hilbert spaces: Fourier series and the Legendre polynomials
14. Orthogonal polynomials: Laguerre and Hermite polynomials
15. Vibrations of a (circular) membrane (with outlook to the problem whether one can hear the shape of a drum)
16. The spin in quantum mechanics
17. Clifford algebras and spin geometry
18. The Dirac Operator
19. The Born–Oppenheimer approximation
20. The geometric phase in quantum mechanics
21. Quantum entanglement
22. Quantum Error Correction on Infinite-Dimensional Hilbert Spaces
23. Foundations of Quantum Computing
24. The Weyl-Moyal product and deformation quantization
25. Quantum transistors and quantum interference
26. Computation and visualization of quantum mechanical operators with python