

**MATH 6260 Geometry of Quantum Fields
Course Projects**

Fall 2023

Course Instructor: Dr. Markus Pflaum

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1. The geometric description of Berry's phase including the Aharonov-Bohm effect (Isabella, Dec 6, talk 1)
2. Uhlmann's connection
3. The theorem of Stone, Naimark, Ambrose, and Godement and its application to algebraic QFT (Connor, Dec 4, talk 1)
4. Symplectic reduction (Emily)
5. Deformation Quantization
6. Fadeev and Popov quantization of non-abelian gauge fields (Johannes, Dec 8, talk 2)
7. Conformal Field Theory and the Virasoro Algebra (Nate, Dec 4, talk 3)
8. Causal perturbation theory à la Epstein-Glaser, Scharf, Dütsch, Fredenhagen, etc.
9. Connes–Kreimer approach to renormalization via Hopf algebras
10. Factorization Algebras in Quantum Field Theory (Ezz, Dec 8, talk 1)
11. Classification of Topological Field Theories after J. Lurie
12. Topological Phases of Matter (Mert, Dec 6, talk 2)
13. Higgs fields (Kenneth, Dec 8, talk 3)
14. Jet bundles in general relativity (Rebecah, Dec 6, talk 3)
15. (Stratifications of spaces of density matrices (Howy, Dec 4, talk 2)