Title: Instantons and Unitarily Inequivalent Quantum Vacua

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Abstract: In the presented thesis we investigate the relationship between the topologically distinct instantonic vacua and the unitarily inequivalent vacua of the quantum field theory. We focus on quantum mechanical examples, where instantons appear but the complications due to quantum gauge field theory are absent. A model for quantum dissipation and the theory of one particle escaping from a metastable minimum were compared, what led to some observations. A double well system was build from harmonic oscillators and an interaction term to get closer to the quantum dissipation model, where inequivalent representations are involved. We identified the particularly simple model of a quantum particle constrained on a circle to be the ideal toy model for spotting the relation among unitarily inequivalent vacua and topologically distinct vacua we were seeking for.