**Application of Multivariable Calculus in Quantum Mechanics**

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The purpose of my research was originally to investigate quantum theory, in particular, analyzing supersymmetric ground state wave functions and finding new mathematical transforms for these functions. However, this area of research required an understanding of calculus that I did not yet possess and as such had to be modified. Thus, my research followed the application of multivariable calculus in quantum mechanics. As Dr. Kouri is a purely theoretical physicist, research under him involved no lab work and had no experimental components. Instead, my research consisted of studying advanced mathematical concepts and ideas and applying these to quantum theory. Foremost among these concepts was the idea of new transforms that would allow a better understanding of ground state wave functions. One of the most basic transforms used in analyzation of wave functions is the Fourier transform. However, the Fourier is limited in its use and applicability. Dr. Kouri theorized that the Fourier is simply a specific case of a more general transform that is more universal in its use and efficacy. Part of my research was devoted to learning more about this general transform. For the most part, however, my research involved elements of multivariable calculus. This included fundamental concepts regarding ways to solve partial differential equations and how this can be applied to quantum theory as well as other scientific fields.