

Topologically Massive Yang-Mills Theory and Link Invariants

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2+1 dimensional gauge theories have been an important theoretical testing ground for new ideas that could potentially be used in 3+1D. After three decades, a good understanding of 2+1D non-Abelian gauge theories still seems out of reach. Many think that using link invariants of knot theory may lead to a better understanding of these theories. With this motivation, we study Chern-Simons(CS) + Yang-Mills theory, also known as topologically massive Yang-Mills theory(TMYM). Using geometric quantization, we calculate the wave-functional for TMYM theory in order to get Wilson Loop expectation values. Then, at large distances where only a topological theory survives, we compare CS and TMYM Wilson Loop expectation values to get a condition that can make Skein relations of knot theory useful for TMYM theory. Furthermore, we study the TMYM Hamiltonian and finally we comment on the mass gap of the theory.

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