Three Dimensional N=2 Supersymmetry on the Lattice

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Abstract: Many interesting conjectures have been made concerning non-perturbative effects in $N = 2$ SUSY Yang-Mills theory with matter in 3 and 4 dimensions. The lattice is the obvious candidate for studying these claims but, as is well known, serious issues arise in attempts to implement SUSY on a lattice. Taking advantage of the super-renormalizability of the 3-d theory, we use well established techniques to show that any $N = 2$ 3-dimensional supersymmetric theory can, in fact, be realized on the lattice with SUSY violating corrections that vanish as the lattice spacing is taken to zero. We present an explicit construction of the technique for both the Wess-Zumino theory and Super Yang-Mills with a fully general matter content.