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Title:	Effect of vacancies in spin models
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Abstract:	The study of t-J like models has always been of interest since it is believed to describe high critical temperature ( $T_C$ ) superconductivity in cuprates ( $\text{CuO}_2$ ). In this thesis we try to understand t-J like models by exploring the phase diagrams of the such toy models. The first chapter of thesis describes the constituents of t-J models which are Heisenberg and Hubbard model(in half-filling limit). Both the models are studied using Exact Diagonalization. The correspondence of both the models are shown by plotting 2 point spatial spin correlation. In the second chapter we study the $J_1 - J_2$ Anti-ferromagnetic Heisenberg system, a highly frustrated model which exhibits phase diagram. We study this system by using Semi-classical Monte Carlo with semi-classical dimers as proxy for quantum fluctuations. In the last part we see the changes in phase diagram on introducing vacancies/holes in the model to simulate an effective t-J like model.
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