

Abstract Submitted  
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**Double Occupancy in low-energy theoreis of doped Mott insulators** PHILIP PHILLIPS, TING PONG CHOY, ROBERT LEIGH, University of Illinois, GEORGE SAWATZKY, University of British Columbia — We review how a proper low-energy theory can be constructed for the Hubbard model by explicitly integrating over the degrees of freedom far away from the chemical potential. A surprsing feature of the exact low-energy theory is the emergence of an elementary charge  $2e$  boson which mediates double occupancy much below the Mott scale. We show that within the standard canonical transformation formalismused to derive the  $t - J$  model from the Hubbard model, a similar feature (double occupancy below the Mott scale) appears ONLY if the electron creation and annihilation operators are properly transformed as well. By comparing precisely how the electron operators transform in both theories, we are able to show that the charge  $2e$  boson mediates dynamical spectral weight transfer across the Mott gap. At half-filling, the interactions mediated by the charge  $2e$  boson defeat the artificial local  $SU(2)$  symmetry found earlier in the projected  $t - J$  model.

R. G. Leigh, P. Phillips and T. -P. Choy, Phys. Rev. Lett. **99** 46404 (2007); arxiv:07071554 (PRB, in press).

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