Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Entanglement versus nonlocality in 3-qubit states SHOHINI GHOSE, Wilfrid Laurier University, NEIL SINCLAIR, University of Calgary —
Quantum correlations or entanglement in coupled systems leads to violations of Bell's inequalities that cannot be explained by a local hidden variable theory. For 2-qubits states, bipartite entanglement (concurrence) is simply related to the Bell-CHSH nonlocality parameter. Our studies focus on a class of 3-qubit states. We consider pure states that cannot be uniquely reconstructed from the reduced two-qubit states, implying that some information is encoded in tripartite correlations. We quantify tripartite entanglement by the 3-tangle [1] and investigate its relationship to the Svetlichny inequality [2] for testing tripartite nonlocality. Although the 3-tangle is always non-zero, we identify some tripartite entangled states for which the Svetlichny inequality is not violated. We analytically confirm previous numerical results [3], and extend past results by using the Svetlichny inequality, which has some advantages over the Mermin inequality used in previous work. We also show that the states considered here are those pure states that have the minimum value of the Svetlichny parameter for a given value of 3-tangle, thus identifying their unique nature in the class of all pure states. Our results highlight the complex nature of entanglement and nonlocality in multipartite states. [1] V. Coffman, et al., Phys. Rev. A 61, 052306 (2000) [2] G. Svetlichny, Phys. Rev. D 35, 3066 (1987) [3] V. Scarani and N. Gisin, J. Phys. A 34, 6043 (2001)

Shohini Ghose
Wilfrid Laurier University

Date submitted: 12 Feb 2008 Electronic form version 1.4