Interference of Rotating Atomic Clouds ERICH MUELLER, Cornell, TIN-LUN HO, The Ohio State University — We study the theory of interference between spinning clouds of ultracold atoms; quantifying how intermeshed vortices in two displaced clouds form intricate patterns when the clouds are overlapped. These patterns, dominated by stripes, can be imaged in circumstances where individual vortices cannot be resolved. We contrast these structures (which were recently observed at JILA [Schweikhard et al. Phys. Rev. Lett. 93, 210403 (2003)]) with the ones which will be seen during the interference of two atomic clouds in highly correlated quantum Hall states. The striking differences in these interference patterns allows one to distinguish coherent and correlated states.