

## Self-Entanglement and the Dissociation of Homonuclear Diatomic Molecules

We introduce the concept of self-entanglement by which a mixed state or ensemble density can be expressed as a pure state in an augmented Hilbert space. The pure state representing the mixed state density is formed by the products of the individual states in the ensemble. We use this concept to show that upon dissociation a homonuclear diatomic molecule will separate into two neutral atoms. The formal distinction between the concept of self-entanglement and the entanglement of system and environmental states in the theory of decoherence is discussed