Quantum Physics

Non-classical correlations from dissociation time entanglement

Clemens Gneiting, Klaus Hornberger

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We discuss a strongly entangled two-particle state of motion that emerges naturally from the double-pulse dissociation of a diatomic molecule. This state, which may be called dissociation-time entangled, permits the unambiguous demonstration of non-classical correlations by violating a Bell inequality based on switched single particle interferometry and only position measurements. We apply time-dependent scattering theory to determine the detrimental effect of dispersion. The proposed setup brings into reach the possibility of establishing non-classical correlations with respect to system properties that are truly macroscopically distinct.

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