Entangled bases with fixed Schmidt number.

Summary: An entangled basis with a fixed Schmidt number $k$ (EB$_k$) is a set of orthonormal basis states with the same Schmidt number $k$ in a product Hilbert space $\mathbb{C}^d \otimes \mathbb{C}^{d'}$. It is a generalization of both the product basis and the maximally entangled basis. We show here that for any $k \leq \min\{d, d'\}$, EB$_k$ exists in $\mathbb{C}^d \otimes \mathbb{C}^{d'}$ for any $d$ and $d'$. Consequently, general methods of constructing SEB$_k$ (EB$_k$ with the same Schmidt coefficients) and EB$_k$ (but not SEB$_k$) are proposed. Moreover, we extend the concept of EB$_k$ to multipartite cases and find out that the multipartite EB$_k$ can be constructed similarly.

Keywords: entangled basis; Schmidt number; pure state
doi:10.1088/1751-8113/48/24/245301