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# High-dimensional Entanglement

*Thursday, 12 July 2012 14:30 (20 minutes)*

### Abstract content <br>   (Max 300 words)

High-dimensional entanglement of quantum systems offers greater possibilities to a number of applications, such as loophole-free tests of nonlocality and new quantum information schemes. We demonstrate the tomographic reconstruction of the high-dimensional quantum states of photon pairs entangled in the orbital angular momentum basis, by providing a full characterisation, in the form of a density matrix, of the entangled states. The density matrices were determined for the entangled two-qudit state, where the dimensions ranged from 2 to 8, limited only by the number of data points and the length of time required. We show that all recorded states have high fidelities and linear entropies required for a violation of the appropriate high-dimensional Bell inequality. This demonstrates a characterisation of the nature of the entanglement, allowing for possibly applications in quantum information science.

### Apply to be<br> consider for a student <br>   award (Yes / No)?

Yes

### Level for award<br> (Hons, MSc, <br>   PhD)?

PhD

### Main supervisor (name and email)<br>and his / her institution

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### Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?

No

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