Title:	Experimental detection of non-local correlations using a local measurement-based hierarchy on an NMR quantum processor
Authors:	Singh, Amandeep (/jspui/browse?type=author&value=Singh%2C+Amandeep) Singh, Dileep (/jspui/browse?type=author&value=Singh%2C+Dileep) Gulati, V. (/jspui/browse?type=author&value=Gulati%2C+V.) Dorai, K. (/jspui/browse?type=author&value=Dorai%2C+K.) Arvind (/jspui/browse?type=author&value=Arvind)
Keywords:	Quantum Information Nuclear magnetic resonance (NMR) Semi-definite program (SDP)
Issue Date:	2020
Publisher:	Springer
Citation:	The European Physical Journal D, 74(8)
Abstract:	The non-local nature of the correlations possessed by quantum systems may be revealed by experimental demonstrations of the violation of Bell-type inequalities. Recent work has placed bounds on the correlations that quantum systems can possess in an actual experiment. These bounds were limited to a composite quantum system comprising of a few lower-dimensional subsystems. In a more general approach, it has been shown that fewer body correlations can reveal the non-local nature of the correlations arising from a quantum mechanical description of nature. Such tests on the correlations can be transformed to a semi-definite program (SDP). This study reports the experimental implementation of a local measurement-based hierarchy on the nuclear magnetic resonance (NMR) hardware utilizing three nuclear spins as qubits. The protocol has been experimentally tested on tripartite pseudo-entangled states such as W state, GHZ state and a few graph states. In all the cases, the experimentally measured correlations were used to formulate the SDP, using linear constraints on the entries of the moment matrix. We observed that for each entangled state, the SDP failed to find a semi-definite positive moment matrix consistent with the experimental data. This implies that the observed correlations can not arise from local measurements on a separable state and are hence non-local in nature, and also confirms that the states being tested are indeed entangled.
URI:	https://link.springer.com/article/10.1140%2Fepjd%2Fe2020-10173-9 (https://link.springer.com/article/10.1140%2Fepjd%2Fe2020-10173-9) http://hdl.handle.net/123456789/3206 (http://hdl.handle.net/123456789/3206)
Appears in Collections:	Research Articles (/jspui/handle/123456789/9)

Files in This Item:

File	Description	Size	Format	
Need to add pdf.odt (/jspui/bitstream/123456789/3206/1/Need%20to%20add%20pdf.odt)		8.63 kB	OpenDocument Text	View/Open (/jspui/bitstream/12345

Show full item record (/jspui/handle/123456789/3206?mode=full)

(/jspui/handle/123456789/3206/statistics)