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Experimental Determination of Thermal Entanglement in Spin Clusters using Magnetic Susceptibility Measurements R.S. SARTHOUR, A.M. SOUZA, Centro Brasileiro de Pesquisas Físicas, D.O. SOARES-PINTO, M.S. REIS, CICECO, Universidade de Aveiro, I.S. OLIVEIRA, Centro Brasileiro de Pesquisas Físicas — Until a few years ago, entanglement was not believed to exist beyond atomic scale, due to the large number of constituents of macroscopic objects. Surprisingly, it was theoretically demonstrated that entangled states can exist in solids at finite temperature and this kind of entanglement is referred in literature as "thermal entanglement". Since then, a few experimental evidences have been reported confirming the presence of entanglement in solids state systems. The present work reports an experimental observation of thermal entanglement in a spin chain formed in the compound $Na_2Cu_5Si_4O_{14}$. The presence of entanglement was investigated through two measured quantities, an Entanglement Witness and the Entanglement of Formation, both derived from the magnetic susceptibility, determined experimentally. It was found that pairwise and tripartite entanglement exist below $\sim$200 K and $\sim$240 K, respectively. A theoretical study of entanglement evolution as a function of applied field and temperature is also presented.

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