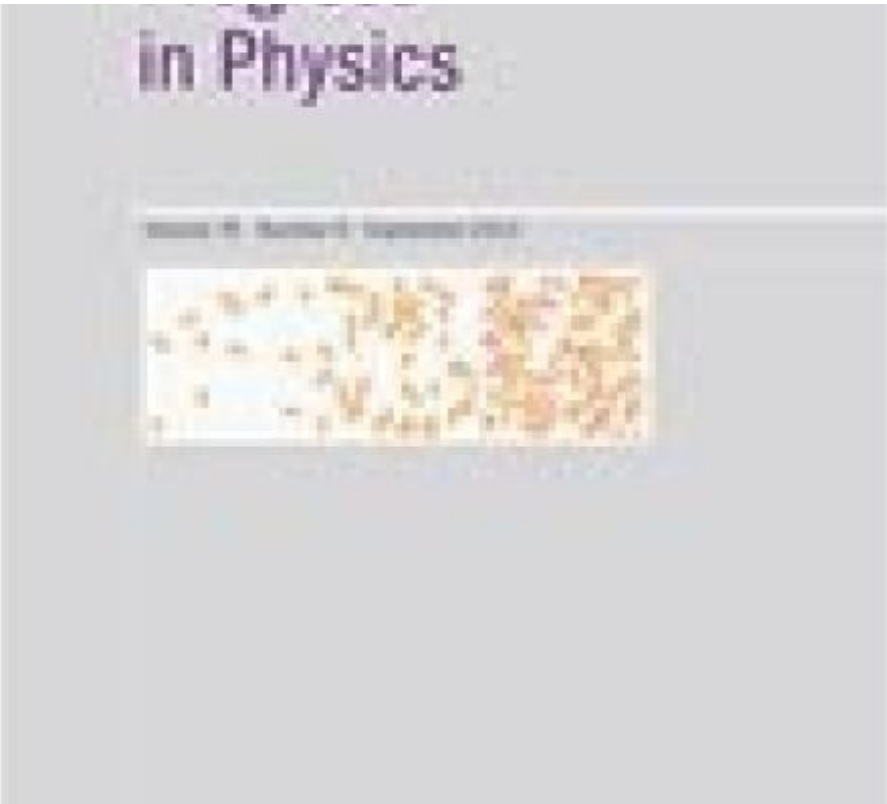

Entanglement distribution in quantum networks

ICFO Review paper on the cover of *Report on Progress in Physics*

October 01, 2013

Entanglement is a key resource for quantum information applications. A crucial problem in quantum information theory is to understand how entanglement can be distributed among distant observers, who can later use it for quantum information purposes. The standard scenario consists of observers in a point-to-point configuration. Yet, with the development of quantum information technologies, the most natural scenario will consist of different observers distributed along a highly connected network. What are the optimal strategies for entanglement distribution in these network topologies?

In the past years, the groups led by ICREA Professors at ICFO Acin and Lewenstein have intensively worked on the study of this problem. In fact, this is one of the main topics in the ERC starting grant proposal awarded in 2008 to Prof. Acin, entitled "Percolating

entanglement and quantum information resources through quantum networks" (PERCENT). The groups led by Professors Acin and Lewenstein have recently published a review article in Report on Progress in Physics, also the cover image for this issue, which contains most of the most relevant results that have appeared during recent years along this question, with an emphasis on percolation-type phenomena, the use of network based error correction for entanglement distribution, or the analysis of entanglement in complex quantum networks.