

Abstract Submitted  
for the MAR16 Meeting of  
The American Physical Society

**Molecular Andreev bound states and Majorana modes in a double dot system**<sup>1</sup> EDSON VERNEK, JOELSON F. SILVA, Federal University of Uberlândia — Nanostructured systems such as quantum dots (QD) connected to superconductors has attracted a lot of attention in the recent years. One of the well known phenomena in such a system is the formation of a pair of bound called Andreev bound states (ABS)<sup>2</sup>. Recently, it have been shown that when a QD is coupled to a topological superconductor wire, a Majorana bound state (MBS) leaks from the end of the wire into the dot<sup>3</sup>. The character of these bound states is much richer in structures like molecules and is far from being completely understood. In this work we study a system composed by a two inter-connected QDs in which one of them is coupled to a normal superconductor and to a normal lead while the other is coupled to a topological superconductor and to a distinct normal metallic lead. We show that in the atomic limit (for small interdot coupling), one of the dot has a pair of ABS whereas the other has a single a MBS. More interestingly, in the molecular regime (large inter-dot coupling) we observe a localized Majorana mode coexisting with a delocalized molecular ABS.

<sup>1</sup>We would like to thank financial support from the Brazilian agencies CNPq, CAPES and FAPEMIG.

<sup>2</sup>T. Meng, S. Florens, and P. Simon, Phys. Rev. B **79**, 224521 (2009).

<sup>3</sup>E. Vernek, P. H. Penteado, A. C. Seridonio, and J. C. Egues, Phys. Rev. B **89**, 165314 (2014).

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Date submitted: 06 Nov 2015

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