SEMPARIS – Séminaires en région parisienne

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Seminaires du LPTM , Universite de Cergy Pontoise

Jeudi 17 Janvier 2019, 14 :00
LPTM, 4.13 St Martin II
Domaines : cond-mat

Titre : *Parafermions and symmetry-enriched Majorana fermions in one-dimensional fermionic models*

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Résumé : *Stabilizing and manipulating exotic emergent quasiparticles is one of the main goal of modern condensed matter physics. The quest for observing Majorana fermions and their non-Abelian braiding statistics in superconducting nanostructures is currently attracting a lot of attention, with fascinating prospects in fault-tolerant quantum computation. Parafermions are the simplest generalization of Majorana fermions : they show non-Abelian fractional statistics and are typically associated with topological phases. We will discuss the possibility of harboring these exotic excitations in genuinely one-dimensional electronic platforms. We focus on a specific model of fermions in one dimension with a generalized ZN multiplet pairing extending the standard and so-called Kitaev chain model. Using a combination of analytical techniques, we find an interesting topological phase intertwined with spontaneous symmetry breaking. Each symmetry-breaking sector is shown to possess a pair of boundary Majorana fermions encoding a topological character. A careful study of the quantum anomaly through pumping in the system finally reveals that parafermions exist in one dimension but only as non-local operators.*