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# Topological vacuum bubbles in a non-Abelian anyon interferometer

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## Abstract

In fermionic and bosonic many-body physics, vacuum bubbles do not contribute to physical observables, known as the linked cluster theorem [1]. However, it is shown [2] that certain vacuum bubbles of Abelian anyons affect physical observables, disobeying the linked cluster theorem. These vacuum bubbles, named as topological vacuum bubbles, represent a virtual anyonic excitation which braids real anyonic excitations. We generalize the concept of the topological vacuum bubble to the case of non-Abelian anyons. Because of non-Abelian braiding statistics, the topological vacuum bubbles affect physical observables in a different way from the Abelian case. We propose how to detect a non-Abelian topological vacuum bubble, hence the non-Abelian fractional statistics, in a fractional quantum Hall interferometer at filling factor  $5/2$ .

A. L. Fetter and J. D. Walecka, *Quantum Theory of Many-Particle Systems* (McGraw-Hill, New York, 1971).

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