The Fractional Statistics of Generalized Haldane Wave Function in 4D Quantum Hall Effect

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Abstract: Recently, a generalization of Laughlin's wave function expressed in Haldane's spherical geometry is constructed in 4D quantum Hall effect. In fact, it is a membrane wave function in CP_3 space. In this article, we use non-Abelian Berry phase to analyze the statistics of this membrane wave function. Our results show that the membrane wave function obeys fractional statistics. It is the rare example to realize fractional statistics in higher-dimensional space than 2D. And, it will help to make clear the unresolved problems in 4D quantum Hall effect.

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