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Skyrmion Quantum tunneling SANGJIN LEE, KAIST, JUNGHOON HAN[1], Department of Physics, Sung Kyun Kwan University, Suwon 440-746, Korea, EUNGOOK MOON[2], KAIST — Skyrmion is a topological spin-texture of pseudo-two dimensional magnetic systems. Classical nature of skyrmions has been thoroughly understood by the Landau-Lifshitz-Gilbert equation, but its quantum nature by contrast is an intriguing yet poorly understood issue. Here, we investigate the quantum nature focusing on quantum tunnelling, which would be a key component of the overall skyrmion-based electronics, so-called skyrmionics. We determine physical properties such as the size and mass of skyrmions *self-consistently*. Characteristic dependences of the physical properties on external magnetic field and Dzyaloshinskii-Moriya interaction are obtained. Armed with the physical properties of skyrmions, we find skyrmion quantum tunneling is observable below 1 K, given typical experimental and material conditions.Several tuning parameters such as external electric-current and the strengths of potential barriers are considered and their intriguing influences on the skyrmion quantum tunnelling through the Berry phase effects are determined. We further propose a plausible experimental setup for the observation of skyrmion quantum tunnelling.

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