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Gravitational Shielding Effect in Gauge Theory of Gravity

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Abstract: In 1992, E.E. Podkletnov and R. Nieminen found that under certain conditions, ceramic superconductor with composite structure reveals weak shielding properties against gravitational force. In classical Newton's theory of gravity and even in Einstein's general theory of gravity, there are no grounds of gravitational shielding effects. But in quantum gauge theory of gravity, the gravitational shielding effects can be explained in a simple and natural way. In quantum gauge theory of gravity, gravitational gauge interactions of complex scalar field can be formulated based on gauge principle. After spontaneous symmetry breaking, if the vacuum of the complex scalar field is not stable and uniform, there will be a mass term of gravitational gauge field. When gravitational gauge field propagates in this unstable vacuum of the complex scalar field, it will decays exponentially, which is the nature of gravitational shielding effects. The mechanism of gravitational shielding effects is studied in this paper, and some main properties of gravitational shielding effects are discussed.

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Key words: gravitational shielding effect, symmetry breaking, quantum gravity, gauge field

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