

The Meaning of Spontaneous Symmetry Breaking (I): From a simple classical model

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Abstract

This paper, part I of a two-part project, aims at answering the simple question 'what is spontaneous symmetry breaking?' by analyzing from a philosophical perspective a simple classical model. Related questions include: what does it mean to break a symmetry spontaneously? Is the breaking causal, or is the symmetry not broken but merely hidden? Is the meta-principle, 'no asymmetry in, no asymmetry out,' violated? And what is the role in this of random perturbations (or fluctuations)?

Keywords: spontaneous symmetry breaking, symmetry breaking, symmetry principle, symmetry, perturbation, equilibrium solution, ground state

[Specific Sciences: Physics: Classical Physics](#)

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