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A gauge invariant description of phase transitions

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Phase transitions are of wide interest to be sure; whether it's in superconductors or the early universe: Beyond the Standard Model scenarios like Baryogenesis cry out for a strong first-order phase transition. So a precise description of phase transitions is vital.

Phase transitions are, in field theory, studied with numerical methods (lattice) and perturbative calculations (the effective potential). Perturbative calculations are quite handy since lattice calculations are as yet rather resource expensive.

But perturbative calculations face a number of obstacles, to wit the expansion breaks down at high temperatures and is gauge dependent. The former problem is often remedied by a resummation; though, this resummation isn't gauge invariant. And so I'll present a gauge invariant method for describing phase transitions using the effective potential. This method also allays the high-temperature breakdown through a gauge invariant resummation.

Secondary track (number)

03

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