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An Infinite Order Phase Transition PRADEEP KUMAR, University of Florida, AVINASH KHARE, Institute of Physics, Bhubaneswar, AVADH SAXENA, Los Alamos National Laboratory — An infinite order phase transition, in the sense envisioned by Ehrenfest, must show no singularity in any finite (thermal or mechanical) derivative of the free energy. By considering the infinite p limit of a free energy that we have derived for a p -th order phase transition, we can derive a Landau type free energy. We will discuss the properties of the free energy and identify the features essential for a description of an infinite order phase transition. These include a logarithmic interaction between the fields and a novel dependence on spatial gradients. Contrary to popular belief, since some symmetry is broken at each finite p order, we submit that an infinite order phase transition does not exclude a symmetry being broken. Restricting to one dimension, we solve for domain wall solutions. Finally we show the relationship between an infinite order phase transition and Tachyon condensation. They are both analyzed as the infinite p limit of a class of p enumerated field theories. The mathematical difference being that the free energy for infinite order transition belongs to a potential that is negative (inverted) of the action for tachyon condensation.

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