

# Review of: "Mass Creation via the Phase Transition of the Higgs Field"

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**Potential competing interests:** No potential competing interests to declare.

The paper "Mass Creation via the Phase Transition of the Higgs Field" by Dimitris M. Christodoulou and Demosthenes Kazanas provides a detailed theoretical exploration of the Higgs potential and its implications for phase transitions in particle physics. The paper revisits the traditional Higgs potential, advocating for a more accurate depiction using catastrophe theory. This approach suggests a Higgs potential that recognizes only a single positive mean value in vacuum, differing from the conventional bistable model. The authors use catastrophe theory to derive the Higgs potential, arguing that it should admit only one positive mean value in vacuum. Beyond discussing the Higgs phase transition, the paper expands its scope to other types of phase transitions, such as chemical reactions and star formation, and even delves into peculiar lambda-transitions.

The paper offers a comprehensive examination of the Higgs potential, integrating concepts from catastrophe theory. Here are some points of concerns:

**Universality of the Theory:** While presenting a new interpretation of the Higgs potential, the paper's applicability to all phenomena related to the Higgs field remains to be further validated.

**Complexity and Empirical Testing:** Despite theoretical robustness, the complexity of the paper might pose challenges for empirical validation. Given the inherent difficulties in experimentally observing the Higgs field, testing this new theory might require more sophisticated experimental setups.

**Challenge to Existing Theories:** The paper's challenge to traditional Higgs potentials, though theoretically supported, raises questions about its widespread acceptance within the current physical framework. For models that have been experimentally validated, this new theory might require substantial evidence for support.