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Analysis of Monopoles Associated with Multi-Step Spontaneous Breaking of Gauge Symmetries

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The 't Hooft–Polyakov monopole is absent in the Standard Model, yet Cho and Maison revealed that the electroweak sector admits a spherically symmetric magnetic monopole solution. The resulting Cho–Maison monopole exhibits unresolved theoretical issues, most notably an energy divergence at the spatial origin. In this work, we analyze a scenario in which a 't Hooft–Polyakov monopole arising in a high-energy completion is mapped onto the Cho–Maison monopole in the low-energy effective theory, thereby providing a unified understanding of monopole configurations across energy scales.

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