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Kibble-Zurek Scaling and String-Net Coarsening in Topologically Ordered Systems

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The classic formulation of the KZ mechanism involves phase transitions with broken symmetries. This work considers instead the the non-equilibrium dynamics of topologically ordered systems driven across a continuous phase transition into proximate phases with no, or reduced, topological order. This is interesting both as a non-trivial extension of the KZ ideas but also on account of the interest in topological phases in the theory of correlated electron systems. The work shows that the dynamics exhibits scaling in the spirit of Kibble and Zurek but now without the presence of symmetry breaking and a local order parameter. The late stages of the process are seen to exhibit a slow, coarsening dynamics for the string-net that underlies the physics of the topological phase, a potentially interesting signature of topological order. The work discusses phase transitions involving both abelian and non-abelian topological order.