Absorbing-State Phase Transitions

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Abstract:
Modern statistical mechanics offers a large class of driven-dissipative stochastic systems that naturally evolve to a critical state, of which Activated Random Walks are perhaps the best example. The main pursuit in this field is to show universality of critical parameters, describe the critical behavior, the scaling relations and critical exponents of such systems, and the connection between driven-dissipative dynamics and conservative dynamics in infinite space. The study of this model was an open challenge for a long time, then it had significant partial progress a decade ago, and got stuck again. Through the last 5 years it has seen exciting progress thanks to contributions by Asselah, Basu, Cabezas, Ganguly, Hoffman, Richey, Schapira, Sidoravicius, Sousi, Stauffer, Taggi, Teixeira, Tournier, Zindy, and myself. These covered most of the questions regarding existence of an absorbing and an active phase for different ranges of parameters, and current efforts are drifting towards the description of critical states, scaling limits, etc. We will summarize the current state of art and discuss some of the many open problems.