

# Applying monoid duality to interacting particle systems

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In the study of interacting particle systems duality is an important tool used to prove various types of long-time behavior, for example convergence to an invariant distribution. The two most used types of dualities are additive and cancellative dualities, which we are able to treat in a unified framework considering commutative monoids (i.e. semigroups containing a neutral element) as cornerstones of such a duality. For interacting particle systems on local state spaces with more than two elements this approach revealed formerly unknown dualities.

As an application of one of the newly found dualities a convergence result of a combination of the *contact process* and its cancellative version, formerly known as the *annihilating branching process*, is presented.

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