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The geometry of a parameter space for interacting particle systems

We consider families of interacting particle systems which act on arbitrary graphs and which are parametrized by five or less numbers. Various duality functions and thinning operators were studied by Sudbury and Lloyd (Ann. Probab. 25 (1997), 96-114). Here we extend their results, using a more geometric approach as Bandt, Hadeler and Kriese (J. Statist. Phys. 1998). In analogy to the Mandelbrot set for complex quadratic functions, there is a kind of geometry on parameter space which carries information on the behaviour of the interacting particle systems. Duality is expressed by affine reflections in parameter space, and thinning by hyperbolic rotation. Particle systems with similar behaviour lie on hyperbolas or on a few singular lines.