

Parallel-tempering cluster algorithm

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Using our new flexible and powerful method for systematic investigations of second-order phase transitions, introduced in Phys. Rev. **E 84** (2011) 036701, we revisit the two-dimensional 3- and 4-state Potts model and the three-dimensional XY model. The combination of the replica-exchange algorithm with cluster updates and an adaptive routine to find the temperature range of interest around the critical point, proved to be very efficient, robust and easy to use.