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# Formulas for probabilities in the asymmetric simple exclusion process.

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## **Abstract**

**In joint work with Craig A. Tracy** we consider the asymmetric simple exclusion process on the integers. Each particle waits exponential time, then with probability  $p$  it moves one step to the right if the site is unoccupied, otherwise it stays put; with probability  $1 - p$  it moves one step to the left if the site is unoccupied, otherwise it stays put. For a finite system we use the Bethe Ansatz to obtain a formula for the probability of a given configuration at time  $t$ . From this we derive a formula, which extends to some infinite systems, for the probability that a given particle is at a given site at time  $t$ . In the case of step initial condition with particles initially at the positive integers the probability can be expressed in terms of Fredholm determinants. Asymptotic results are obtained using this representation.