Large deviations of the current in the open exclusion process

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The asymmetric simple exclusion process is used as a template to study various aspects of non-equilibrium statistical physics. It appears in many models of low-dimensional transport with constraints. In the steady state, a non-vanishing current is carried through the system. In this talk, we shall explain how to derive the statistics of the current for an ASEP with open boundaries and shall give exact combinatorial formulas valid for systems of all sizes and for all values of the parameters. Our results are obtained by using an extension of the Matrix Product Representation method.