



Contribution ID: 42

Type: **Flash talk**

## Exact percolation probabilities on plane, cylinder, and torus: site percolation on a square lattice

*Monday, 27 September 2021 13:55 (5 minutes)*

For site percolation on a square lattice, exact percolation probabilities on plane, cylinder, and torus has been found. Topological dynamic programming was applied to improve performance. Topologically equivalent states of the system and their horizontal reflections were combined. In the case of a torus and a cylinder, the shifts of topological states were also taken into account. Percolation probabilities were obtained for systems up to size  $L = 16$  (square), up to  $L = 17$  (cylinder), up to  $L = 9$  (torus). Along with a finite size scaling analysis, percolation probabilities provide an efficient method to obtain the percolation threshold.

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**Session Classification:** S2