

# CONFIGURATION SPACES OF HARD DISKS IN AN INFINITE STRIP

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This talk is based on joint work with Robert MacPherson. We study the configuration space  $\text{config}(n,w)$  of  $n$  nonoverlapping disks of unit diameter in an infinite strip of width  $w$ . Our main result establishes the rate of growth of the Betti numbers  $\beta_j[\text{config}(n,w)]$  for every fixed  $j$  and  $w$  as  $n \rightarrow \infty$ .

We identify three regions in the  $(j,w)$  plane exhibiting qualitatively different topological behavior. We describe these regions as (1) a “gas” regime where homology is stable, (2) a “liquid” regime where homology is unstable, and (3) a “solid” regime where homology is trivial. We describe the boundaries between stable, unstable, and trivial homology for every  $n \geq 3$ .

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