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This is a preliminary report on joint work with Richard Ehrenborg and Sergey Kitaev. A 123-avoiding permutation is a permutation  $\sigma = (\sigma(1), \dots, \sigma(n))$  of  $(1, \dots, n)$  with the property that no sequence of the form  $\sigma(i) < \sigma(i+1) < \sigma(i+2)$  occurs. The goal is to obtain asymptotics for the number of 123-avoiding permutations (and other classes of pattern-avoiding permutations) on  $n$  symbols as  $n \rightarrow \infty$ . We develop a general method which solves this counting problem using the spectral theory of integral operators on  $L^2[0, 1]^m$  where  $m+1$  is the length of the pattern. Our methods give detailed asymptotic expansions and allow for explicit computation of leading terms in several cases. (Received August 29, 2005)