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**Richard Ehrenborg** (jrge@ms.uky.edu), Department of Mathematics, University of Kentucky, Lexington, KY 40506-0027, **Sergey Kitaev** (sergey@ru.is), Reykjavik University, Ofanleiti 2, IS-103 Reykjavik, Iceland, and **Peter Perry\*** (perry@ms.uky.edu), Department of Mathematics, University of Kentucky, Lexington, KY 40506-0027. *Counting Pattern-Avoiding Permutations with Perron and Frobenius.*

This talk reports on joint work with Richard Ehrenborg and Sergey Kitaev, and gives a new method for counting consecutive pattern-avoiding permutations using the spectral theory of integral operators. Let  $\mathfrak{S}_n$  denote the symmetric group on  $n$  symbols; a *pattern* of length  $k$  is a subset  $S$  of  $\mathfrak{S}_k$ . For  $x = (x_1, \dots, x_k) \in \mathbb{R}^k$  with  $x_i \neq x_j$  for  $i \neq j$ , let  $\Pi(x)$  denote the unique permutation in  $\mathfrak{S}_k$  with  $\pi_i < \pi_j$  if and only if  $x_i < x_j$ .  $1 \leq i < j \leq k$ . A permutation  $\pi \in \mathfrak{S}_n$  avoids the consecutive pattern  $S$  if  $\Pi(\pi_j, \dots, \pi_{j+k-1}) \notin S$  for any  $j$  with  $1 \leq j \leq n - k + 1$ .

We express the probability that a randomly selected  $\pi \in \mathfrak{S}_n$  avoids  $S$  in terms of a positivity-preserving integral operator  $T_S$  which serves as a kind of transfer operator for the counting problem. The spectral theory of  $T_S$  determines the large- $n$  asymptotics of this probability through Krein and Rutman's extension of the Perron-Frobenius theorem of matrix theory. We compute asymptotics in several cases of interest and represent the exponential generating function for the counting problem as a renormalized determinant of  $(I - T_S)$ . (Received August 29, 2006)