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Thomas Joachim Bothner* (bothner@umich.edu), 2074 East Hall 530 Church Street, Ann Arbor, MI 48109-1043. *From gap probabilities in random matrix theory to eigenvalue expansions.*

We present a method to derive asymptotics of eigenvalues for trace-class integral operators $K : L^2(J; d\lambda) \curvearrowright$, acting on a single interval $J \subset \mathbb{R}$, which belong to the ring of integrable operators. Our emphasis lies on the behavior of the spectrum $\{\lambda_i(J)\}_{i=0}^\infty$ of K as $|J| \rightarrow \infty$ and i is fixed. We show that this behavior is intimately linked to the analysis of the Fredholm determinant $\det(I - \gamma K)|_{L^2(J)}$ as $|J| \rightarrow \infty$ and $\gamma \uparrow 1$ in a Stokes type scaling regime. Concrete asymptotic formulæ are obtained for the eigenvalues of Airy and Bessel kernels in random matrix theory as well as kernels which are related to a Painlevé I hierarchy. (Received September 17, 2015)