Completely monotonic Fredholm determinants

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Time: Wednesday 24.07., 11:00 - 11:30, Room SH 02

Abstract: This talk is based on a joint work with Professor Mourad Ismail. In this talk we discuss some monotonicity questions related to Fredholm matrices and operators. A function $f(x)$ is called completely monotonic if $(-1)^m f^{(m)}(x) > 0$. It is known that the expectation of having m eigenvalues of a random Hermitian matrix in an interval is a multiple of $(-1)^m$ times the m-th derivative of a Fredholm determinant at $\lambda = 1$. In this work we extend the positivity to half-real line $(-\infty, 1]$, and we also study the completely monotonicity of some special functions which arise as Fredholm determinants.