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# Szegő-type asymptotics for the half-filled lowest Landau level

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Consider the Landau Hamiltonian $H = -\frac{\partial^2}{\partial x_1^2} + \left(-i\frac{\partial}{\partial x_2} - Bx_1\right)^2$ in Landau gauge acting on $L^2(\mathbb{R}^2)$. Let $1_{\{B\}}(H)$ be the spectral projection onto the (infinitely degenerate) eigenspace corresponding to the eigenvalue $\lambda = B$. Leschke, Sobolev and Spitzer established an asymptotic expansion of the form \[ \operatorname{tr}h(1_{[-l,l]^2} 1_{\{B \}}(H) 1_{[-l,l]^2}) = \alpha l^2 + \beta l + o(l) \] as $l \to \infty$, for fairly general functions $h$ with $h(0) = 0$. Our main result is a corresponding asymptotic expansion when replacing the projecton $1_{\{B\}}(H)$ by a subprojection $P$ onto a subspace incorporating only "half" the eigenfunctions (in a sense that will be made precise). We will see that in this case the subleading behavior of the asymptotic expansion features an additional logarithmic enhancement term $\log l$.

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