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Mathematics > Functional Analysis

## Exact spectrum of the Laplacian on a domain in the Sierpinski gasket

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For a certain domain \$\Omega\$ in the Sierpinski gasket \$\mathcal{SG}\$ whose boundary is a line segment, a complete description of the eigenvalues of the Laplacian under the Dirichlet and Neumann boundary conditions is presented. The method developed in this paper is a weak version of the spectral decimation method due to Fukushima and Shima, since for a lot of `"bad" eigenvalues the spectral decimation method can not be used directly. We also prove an analogue of Weyl's classical result on the eigenvalue asymptotics of the eigenvalue counting function \$\rho^\Omega(x)\$. The ratio \$\rho^\Omega(x)/x^{\log3/log 5}\$ is bounded but non-convergent as \$x\rightarrow\infty\$. Moreover, we explain that the asymptotic expansion of \$\rho^\Omega(x)\$ admits a second term of the order \$\log2/log 5\$, that becomes apparent from the experimental data. This is very analogous to the conjectures of Weyl and Berry.

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