Random boundary conditions for open resonators and the Laplace–Beltrami–Weyl asymptotics

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Motivated by engineering and Photonics research on open resonators in structured deterministic or stochastic environments, the talk introduces rigorous randomizations of absorbing and conservative boundary conditions on Lipschitz boundaries. As underlying PDEs, we choose div-grad acoustic systems, which can be also considered as dimensionally reduced Maxwell equations. We give a description of random m-dissipative boundary conditions that produce acoustic operators with almost surely (a.s.) compact resolvents, and so, also with a.s. discrete spectra, which may be interpreted as stochastic point processes. Based on these results, examples of mathematically convenient randomizations are constructed in terms of eigenfunctions of Laplace–Beltrami operators. It will be shown that, for these special randomizations, the resolvent compactness is connected with the Weyl law on the boundary. If time allows us, the asymptotics of the Laplace–Beltrami eigenvalues on non-smooth boundaries will be also discussed. The talk is based on the paper

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