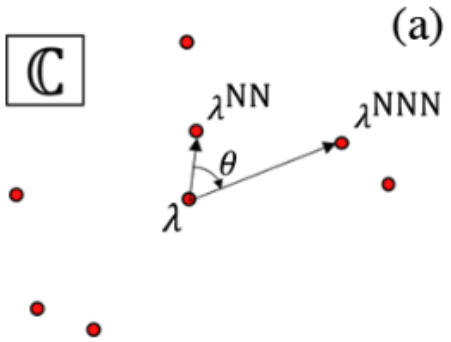
Complex spacing ratio: a signature of dissipative quantum chaos

Figure 1

Assume the set $\{\lambda_k\}_{k=1}^N$ is the spectrum of a Hermitian or non-Hermitian matrix. The spacing ratio define as

$$z_k = \frac{\lambda_k^{\mathrm{NN}} - \lambda_k}{\lambda_k^{\mathrm{NNN}} - \lambda_k}$$

- nearest-neighbor distance eigenvalue: λ_k^{NN}
- next-nearest-neighbor distance eigenvalue: λ_k^{NNN}



Therefore we can obtain

$$z_k := \frac{r_{\mathrm{NN}} e^{i\theta_{\mathrm{NN}}}}{r_{\mathrm{NNN}} e^{i\theta_{\mathrm{NNN}}}} = r e^{i\theta} = x + \mathrm{i}y$$

- distance ratio: $r \in [0, 1]$