

# WEAKLY COUPLED SYSTEMS AND AVOIDED EIGENVALUE CROSSINGS

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We discuss typical situations where a family  $S(\lambda)$  of self-adjoint operators in a Hilbert space  $\mathcal{H}$  exhibits the phenomenon of *avoided eigenvalue crossings*, i.e., at certain points eigenvalues come extremely close to one another but do not cross (while, at the same time, the eigenprojections do cross). All our examples come with a comparison family  $T(\lambda)$  that is close to  $S(\lambda)$  and which decouples in a suitable sense. We are thus led to conjecture that avoided crossings are related to weak coupling or symmetry breaking. We also discuss the shift of eigenvalues under weak coupling and some implications for the numerical computation of eigenvalues.