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The role of resonant and off-resonant modes in Non-Markovian behaviour VIGNESH VENKATARAMAN, DOUGLAS PLATO, MYUNGSHIK KIM, Imperial College London — For some solid state and biological systems, a master equation approach using a Markov approximation will not accurately describe the dynamical behaviour and therefore work has been done to quantify the amount of non-Markovian behaviour in a model. We investigate a harmonic oscillator coupled to a bath of oscillators under the rotating wave approximation using a covariance matrix approach. Concentrating on an entanglement based non-Markovianity measure proposed by Rivas et al [1] we consider the role resonant and off-resonant modes play in affecting the measure. We use a large finite bath of oscillators for both Ohmic and Super Ohmic spectral densities and find, by varying the coupling strength, that at small values the resonant modes have the greatest effect but after a certain threshold of coupling strength the off-resonant modes play the dominant role.

[1] A. Rivas, S. F. Huelga, and M. B. Plenio, Phys. Rev. Lett. 105, 050403 (2010)

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