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Population trapping in non-Markovian waveguide quantum electrodynamics architectures — A study based on Tensor Networks[1] PAWAN KHATIWADA, LOGAN PATRICK, UMAR ARSHAD, IMRAN MIRZA, Miami University — With the realization of entanglement as an information resource in quantum information sciences, physicists have developed a fresh approach to study complex many-particle setups. The framework of Tensor Networks (TN)[1,2] in this context has shown great potential to predict the energy level configuration of the complicated many-body systems. In this presentation, we are going to take a rather simple example from quantum optics, namely, a triply excited three-qubit architecture coupled with a bidirectional waveguide to apply the machinery of the TN. To make the comparison with the standard techniques in quantum optics literature, we'll also show the master equation treatment of the same problem. A comparison between the master equation and the TN theory will be emphasized. Finally, we'll highlight the possible applications of this problem in quantum networking and quantum communication protocols. [1] "A practical introduction to tensor networks: Matrix product states and projected entangled pair states", Roman Orus, Annals of Physics 349, 117-158 (2014). [2] "Entanglement in many-body quantum systems", Pawan Khatiwada and Imran M. Mirza, Frontiers in Optics/Laser Science, B. Lee, C. Mazzali, K. Corwin, and R. Jason Jones, eds., OSA Technical Digest (Optical Society of America, 2020), paper JM6A.23.

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