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Dressed emitters as impurities

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Here, we present a compact formulation of the resolvent-based theory for calculating atom-photon dressed states built on the idea that the atom behaves as an effective impurity *(i)*. This establishes an explicit connection with the standard impurity problem in condensed matter. When the impurity reduces to a vacancy, the resulting class of dressed states play a central role in the emerging area of topological quantum optics *(ii)* in that any topologically-robust dressed state is a VDS *(iii)*.

(i) L. Leonforte, D. Valenti, B. Spagnolo, A. Carollo, F. Ciccarello, arXiv:2108.11963

(ii) M. Bello, G. Platero, J. I. Cirac, and A. González-Tudela, Sci. Adv. 5, eaaw0297 (2019)

(iii) L. Leonforte, A. Carollo, F. Ciccarello, PRL 126, 063601 (2021)

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