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Open quantum systems, non-Hermitian systems: Bound states in continuum vs. spectral singularities[1] SAVANNAH GARMON, Osaka Prefecture University — Bound states residing directly in the scattering continuum were first predicted in 1929 [1] but only verified in optical waveguide array experiments quite recently. In this talk, we analyze a model for one such experiment [2] to demonstrate that the *bound state in continuum* can be viewed as a resonance state for which the imaginary part of the complex eigenvalue vanishes as a result of quantum interference at specific parameter values. We then introduce a non-Hermitian extension of this model that incorporates a localized energy input into the array. We show that the energy input can again be used to push the resonance state into the continuum, but in this case it results in a standing wave that extends throughout the array. This resonance embedded in the continuum is also referred to as a *spectral singularity* in part because the transmission diverges at the embedded energy [3]; hence, this state is equivalent to a lasing mode. As an application, we show how the lasing condition can be obtained with an arbitrarily small energy input. [1] J. von Neumann and E. Wigner, Phys. Z. **30**, 465 (1929); [2] Y. Plotnik, et al, Phys. Rev. Lett. **107**, 183901 (2011); [3] S. Garmon, M. Gianfreda, and N. Hatano, Phys. Rev. A **92**, 022125 (2015).

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