

# **Spectral Singularities and Resonating Waveguides**

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Nowadays mathematical physics usually means the art of transforming shaky mathematical results obtained and used by physicists into rigorous mathematics. This talk will be an example of doing mathematical physics in the opposite direction, the way it was done in the early 20<sup>th</sup> century. That is, starting from a conceptual problem related to quantum mechanics, I will lead towards a half-a-century old and essentially forgotten mathematical concept called “spectral singularity.” Then I will explain how asking for the physical meaning of this concept gave rise to the recent discovery of a physical effect with important potential applications. I will also propose an experimental setup for detecting this effect in certain (optical) waveguides (hoping that I can convince experimentalists to look for it in their lab).

Although the results I will report made use of some basic results of real and complex analysis, classical electrodynamics and quantum mechanics, the main prerequisite for following this talk is a working knowledge of linear algebra and second order linear differential equations.