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# Resurgence for Superconductors

*Tuesday, 11 June 2019 16:45 (1 hour)*

One of the most important non-perturbative effects in Nature is the energy gap of superconductors, which is exponentially small in the coupling constant. A natural question is whether this effect can be incorporated in the theory of resurgence. In this talk I will argue that this is the case. More precisely, I conjecture that the perturbative series for the ground state energy of a superconductor is factorially divergent, and its leading Borel singularity corresponds to the superconducting gap. In the case of the attractive Gaudin-Yang model (a superconductor in one dimension), I develop techniques that make it possible to calculate the exact perturbative series of the ground state energy up to very high order, providing a non-trivial test of this conjecture. For superconductors in three dimensions, evidence for this conjecture can be given by using diagrammatic methods. We also argue that the leading Borel singularity is of the renormalon type, associated to factorially divergent subdiagrams.

## Summary

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