

Summary of Planning Meeting for KITP Program Resurgent Asymptotics in Physics and Mathematics

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October 11, 2017

Summary of topics to be discussed and studied during the Resurgent17 KITP program:

1. What interests you about resurgence?

- contour deformation in path integrals (Lefschetz thimbles)
- uncovering/discovering new non-perturbative physics
- resurgence in PDEs
- Q: when is a function resurgent?
- QCD phase diagram (sign problem)
- gauge-string duality
- quantization of integrable systems
- alien calculus and bridge equations
- dynamical systems
- combinatorial "mould theory"
- "acceleration theory"

2. Current projects

- resurgence and the operator product expansion (OPE)
- resurgence and gauge theory (continuum and lattice)
- Painlevé systems (equational and parametric resurgence)
- perturbative/nonperturbative (P/NP) relations
- resurgence and new resummation methods
- resurgence and the holomorphic anomaly equation
- resurgence and random matrix theory
- resurgence and lattice stochastic perturbation theory

- resurgence for Chern-Simons partition functions
- resurgence in classical and quantum field theory (PDEs)
- resurgence and SYK models
- resurgence and instanton \leftrightarrow knot duality
- resurgence and SUSY QFT and saddles
- resurgence and discrete time QM

3. What aspects of resurgence to learn about at KITP?

- resurgence and lattice gauge theory, and complexified configurations
- resurgence for quantum mechanics and low dimensional QFT
- relation to thermodynamic Bethe ansatz (TBA) and integrability
- physics applications and heuristics
- resurgence in dynamical systems
- Morse theory and resurgence
- Picard-Lefschetz theory and relative homology
- parametric resurgence
- resurgence and effective field theory
- resurgence and category theory, and quantization
- resurgence and gravitational theory