Opening conference of the CRC 1624: Higher structures, moduli spaces and integrability

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talk 6: The arithmetic of non-perturbative effects

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Perturbative expansions in quantum theory, particularly in quantum field theory and string theory, are typically factorially divergent due to hidden non-perturbative sectors. First developed in the 1970s and 80s, the theory of resurgence provides universal machinery to extract non-perturbative effects, which are encoded in exponentially small corrections, from the perturbative series itself. Very recently, it has been observed that, under special assumptions, non-perturbative data accessed via resurgent methods exhibit intrinsic numbertheoretic properties, which appear to be rooted in symmetries of the geometry underlying the quantum theory. The framework of modular resurgence aims to formalise this observation. In this talk, I will first introduce the systematic, algebraic approach of resurgence to the problem of divergences. I will then describe the emerging bridge between non-perturbative effects and arithmetic structures and conclude with a concrete example from topological string theory.

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