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From number theory to QFT (and beyond)

Tuesday 14 May 2024 15:30 (30 minutes)

Inspired by the method of smoothed asymptotics developed by Terence Tao, we introduce a new ultra-violet regularisation scheme for loop integrals in quantum field theory which we call ηeta regularisation. This allows us to reveal a surprising connection between the elimination of divergences in divergent series of powers and the preservation of gauge invariance in the regularisation of loop integrals in quantum field theory. In particular, we note that a method for regularising the series of natural numbers so that it converges to minus one twelfth inspires a regularisation scheme for non-abelian gauge theories coupled to Dirac fermions that preserves the Ward identity for the vacuum polarisation tensor.

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