

Around the functional equation

lundi 8 avril 2019 10:30 (50 minutes)

The functional equation for the Riemann zeta function is based on analysis of asymptotic behaviour for $t \approx 0$ of expression like $\text{Tr}(\exp(-zD^2))$, where D is, say, an elliptic operator on a smooth closed manifold M . In particular, it depends heavily on the fact that the expressions like $\text{Tr}(\exp(-zD^2))$ have Melin transform which is holomorphic on a subspace of the complex plane of the form $\text{Re}(z) > C$, which is a consequence of finite dimensionality of M . We will construct an analogue of the meromorphic extension of the Riemann zeta function and prove the corresponding functional equation in the infinite dimensional limit case.

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