

## MLL-KOLLOQUIUM

Donnerstag, 29.06.2017, 16<sup>15</sup> Uhr

Hörsaal der LMU in Garching, Am Coulombwall 1  
Treffen zum gemeinsamen Kaffee 16 Uhr

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### The Riemann Zeta Function and Quantum Mechanics

The Riemann zeta function  $\zeta$  plays a crucial role in number theory as well as physics. Indeed, the distribution of primes is intimately connected to the non-trivial zeros of this function. We briefly summarize the essential properties of the Riemann zeta function and then present a quantum mechanical system which when measured appropriately yields  $\zeta$ . We emphasize that for the representation in terms of a Dirichlet series interference suffices to obtain  $\zeta$ . However, in order to create  $\zeta$  along the critical line where the non-trivial zeros are located, we need two entangled quantum systems. In this way entanglement may be considered the quantum analogue of the analytical continuation of complex analysis. We also analyze the Newton flows of  $\zeta$  as well as of the closely related function  $\xi$ . Both provide additional insight into the Riemann hypothesis.

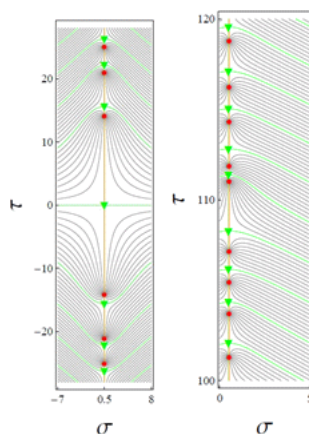


Figure 1: Lines of constant phase of the function  $\zeta$ .