



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

Mathematics Colloquium

Thursday, November 7, 2024
3:30–4:30 p.m.
Phillips Hall 332

Zeta functions and symplectic duality

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Abstract. The Riemann zeta function was introduced by Euler, but carries Riemann’s name because he was the one who extended it to a meromorphic function on the entire complex plane, and discovered its importance for the distribution of primes. It admits a vast class of generalizations, called L-functions, but, as in Riemann’s case, one usually cannot prove anything about them without relying on seemingly unrelated integral representations.

In joint work with David Ben-Zvi and Akshay Venkatesh, we elucidate the origin of such integral representations, showing that they are manifestations of a duality between nice Hamiltonian spaces for a pair (G, \check{G}) of “Langlands dual” groups. Over the geometric cousins of number fields – algebraic curves and Riemann surfaces – such dualities had been anticipated and constructed in many cases by Gaiotto and others, motivated by mathematical physics.

In this talk I will give an introduction to this array of ideas, assuming only some basic definitions in Galois theory and topology.