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L-functions, representation theory, and geometry.

The local Langlands program predicts that one can associate representations π of p-adic groups to group homomorphisms called "L-parameters" ϕ. Moreover, one can attach complex meromorphic functions $L(\pi, s)$ and $L(\phi, s)$ to these objects, in such a way that if π is "associated" with ϕ, then $L(\pi, s) = L(\phi, s)$. It is predicted that algebraic properties of π and ϕ are encoded in the analytic behavior of the functions $L(\pi, s)$ and $L(\phi, s)$. In this talk, we will discuss recent progress on some of these conjectures which relies on a certain "geometrization" of these ideas; namely the p-adic Kazhdan-Lusztig hypothesis.