

# Functoriality, trace formula, and related problems

## Abstract

The Arthur-Selberg trace formula is a vast generalization of the classical Poisson summation formula to the non-abelian setting of a reductive algebraic group. It is one of the most powerful and prominent tools in number theory and the modern theory of automorphic forms. It has found spectacular applications to functoriality and in particular to the theory of endoscopy. In his recent proposal, called “Beyond Endoscopy”, Langlands proposed a strategy to attack the general functoriality conjectures using the trace formula in a non-standard way.

In this talk I will introduce functoriality and beyond endoscopy, then talk about the trace formula. I will describe some of the problems one encounters in trying to execute beyond endoscopy in the context of  $GL(2)$ , and then report on recent progress towards these problems. If time permits I will also talk about recent questions about the trace formula itself, raised by Arthur, that are motivated by considerations related to beyond endoscopy.