

# **$L$ -INVARIANTS OF SYMMETRIC POWERS OF MODULAR FORMS**

ROBERT HARRON

ABSTRACT. In this talk, I'll discuss the Iwasawa theory of symmetric powers of modular forms, specifically focussing on the phenomenon of  $L$ -invariants of their  $p$ -adic  $L$ -functions. These  $p$ -adic invariants arise when there's a glitch in the interpolation property defining a  $p$ -adic  $L$ -function. Following some work of Ferrero–Greenberg/Gross–Koblitz and Mazur–Tate–Teitlebaum, the *derivative* of the  $p$ -adic  $L$ -function is then conjectured to interpolate the classical  $L$ -values up to some factor, called the  $L$ -invariant.

In the first part, I'll give an overview of Iwasawa theory from a modern perspective, introducing  $L$ -invariants and exceptional (a.k.a. trivial) zeroes of  $p$ -adic  $L$ -functions along the way. After that, I'll talk about what we know in the case of symmetric powers of modular forms and why we might care. Finally, I'll explain some of my work on the subject, including some ongoing work on the non-ordinary CM case that is joint with Antonio Lei.