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Number theory and stable homotopy groups of spheres

This will be a short survey talk. I will sketch the basic ideas and techniques for computing stable homotopy groups of spheres, and other finite CW-complexes, by means of the group cohomology of Morava stabilizer groups, i.e., the automorphism groups of one-dimensional formal group laws. Then I will review the cases in which such computations result in a formula which describes the orders of some part (given by a Bousfield localization) of the stable homotopy groups of some finite CW-complex, in terms of number-theoretic data: special values of an L-function, e.g. the Riemann zeta-function. This gives a compact and digestible way to describe the orders of various periodic families in the stable homotopy groups of finite CW-complexes, especially spheres.