Equivariant Iwasawa theory, Hecke characters and the K-theory of number fields

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In recent work with Greither, we proved a main conjecture in equivariant Iwasawa theory, refining Wiles' results on the classical main conjecture over totally real number fields. Via Iwasawa co-descent this permitted us to prove a refinement of the classical Brumer-Stark conjecture (under certain hypotheses.) In joint work with Banaszak, we used these results to construct a family of algebraic Hecke characters for an arbitrary CM number field, generalizing Weil's Jacobi sum Hecke characters. Further, we used certain special values of these Hecke characters to construct "Stickelberger splitting" maps for the localization sequences in the Quillen K-theory of CM and totally real number fields. We will review these results and constructions and comment on further potential applications to the classical conjectures of Iwasawa and Kummer-Vandiver on class-groups of cyclotomic fields.