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**Ralph Greenberg, Karl Rubin and Alice Silverberg\***, Mathematics Department, University of California, Irvine, CA 92697-3875. *Mod 7 and 7-adic Galois representations of elliptic curves.*

Given a group  $C$  of order 7 with a Galois action (in characteristic not 2, 3, or 7), we construct the family of all elliptic curves with a rational subgroup Galois-isomorphic to  $C$ . We study in detail the family where  $C = \mu_7^{\otimes 5}$ , and give an application to images of 7-adic representations associated to elliptic curves over  $\mathbb{Q}$ . (Received September 19, 2009)