

**Buzzard, Kevin; Taylor, Richard**

**Companion forms and weight one forms.** (English) Zbl 0965.11019  
*Ann. Math. (2)* 149, No. 3, 905-919 (1999).

This paper is an important link in the second author's programme that has been successful in proving very many cases of Artin's conjecture on the holomorphy of  $L$ -series attached to non-trivial irreducible 2-dimensional complex representations of the Galois group  $G_{\mathbb{Q}}$  of  $\mathbb{Q}$  [see *Pac. J. Math.* 1997, Spec. Issue, 337-347 (1997; [Zbl 0942.11031](#))].

The main theorem of the paper proves that a continuous 2-dimensional  $\ell$ -adic representation  $\rho$  of  $G_{\mathbb{Q}}$  ( $\ell > 3$ ) that is unramified at almost all primes, that is residually modular and absolutely irreducible, and that at  $\ell$  is unramified with eigenvalues that are residually distinct arises from a holomorphic weight one newform. That  $\rho$  arises from an overconvergent form of weight one follows without much difficulty from the results of Wiles et al. [see *B. Mazur* and *A. Wiles*, *Compos. Math.* 59, 231-264 (1986; [Zbl 0654.12008](#))].

The main contribution of this paper is a beautiful argument that proves that under the above hypotheses the overconvergent form is indeed a classical (holomorphic) form of weight one. The authors prove this by studying the rigid analytic geometry of modular curves, and invoking "rigid GAGA".

Reviewer: [Chandrashekhara B. Khare \(Mumbai\)](#)

**MSC:**

[11F33](#) Congruences for modular and  $p$ -adic modular forms  
[11F11](#) Holomorphic modular forms of integral weight  
[11F80](#) Galois representations

Cited in **9** Reviews  
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Artin's conjecture; Galois group;  $\ell$ -adic representation; holomorphic weight one newform; overconvergent form of weight one; rigid analytic geometry of modular curves; rigid GAGA

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