PUBLICATION WITH ERRATA

Numbering is as in the list of publications.

[3] Harris, M.: P-adic representations arising from descent on abelian varieties. *Compositio Math.* **39**, 177-245 (1979); Correction, Compositio Math. (2000).

The principal error in this paper was the incorrect claim that Iwasawa's sufficient criterion for a compact Λ–module to be torsion — that its group of coinvariants be finite — generalizes to the non-abelian situation. A correct criterion, involving the Euler characteristic, has since been found by Susan Howson. Several proofs based on the fallacious criterion are replaced by alternative proofs in the Correction. However, in the absence of a valid criterion, it is impossible to justify the claim that certain modules constructed from Selmer groups of elliptic curves are torsion Λ–module. Using the Euler characteristic criterion, Coates and Howson found the first examples of torsion modules over the Iwasawa algebra of $GL(2,\mathbf{Z}_p)$ coming from Selmer groups of elliptic curves.

To my knowledge,the remainder of the results of this paper are correct, when taken in conjunction with the correction. This includes some of the basic structural theory of compact Λ–modules in the non-abelian case, the proof that the Λ–module constructed from ideal class groups (the direct analogue of the module studied by Iwasawa) is torsion, and certain control theorems.

[RETRACTED] Harris, M.: The annihilators of p-adic induced modules. *J. of Algebra* **67**, 68-71 (1980). NOTE: Jordan Ellenberg found a fatal flaw in the main argument, so this paper should be disregarded. The problem is the deduction on lines -2 and -3 of p. 69, which is not justified. Ardakov and Wadsley have since shown (arXiv:1308.5104) that the main result is false for every semisimple p-adic group.

[6] Harris, M.: Special values of zeta functions attached to Siegel modular forms. *Annales Scient. de l'Ec. Norm. Sup.* **14**, 77-120 (1981).

A rumor has been circulating to the effect that one of the statements used in this article was not proved until several years later, and that the proofs are therefore incomplete. Apparently this is based on a misunderstanding. The statement in question, as far as I can tell, is 3.6.2, the claim that the antiholomorphic highest weight module for Sp(2n) is irreducible down to weight n/2. This is of course a simple consequence of the unitarity of the module (cited in 3.6.1), the fact that it is generatedby a highest weight vector, and the well known fact that any submodule is generated by highest weight vectors. If there is anything more to the rumor I don't know what it is.

[12] Harris, M.: Arithmetic vector bundles on Shimura varieties, in Automorphic Forms of Several Variables, Proceedings of the Taniguchi Symposium, Katata, 1983 , 138-159. Boston: Birkhaüser (1984).

The argument in 3.5 of this mainly expository paper, concerning jet bundles, is nonsense. A correct argument is given in the subsequent articles.

[13] Harris, M.: Arithmetic vector bundles and automorphic forms on Shimura varieties. I. *Inventiones Math*. **82**, 151-189 (1985).

The term "arithmetic vector bundle" has since been replaced by "automorphic vector bundle". The argument in (3.6.7), deriving existence of a model over a number field of an "absolutely arithmetic" automorphic vector bundle by means of a cocycle condition involving Aut(**C**), needs further justification. [SEE NOTE BELOW.] A simpler alternative is to observe that a quotient of the canonical principal bundle I(G,X) by a finite subgroup C of the center of G is already defined over the reflex field E(G,X). One can take C to be the intersection of the center of G with the derived subgroup G^{der}. Indeed, the fact that the quotient of I(G,X) by the center of G is defined over E(G,X) follows from Proposition 3.7, whereas the fact that the quotient by G^{der} is defined over E(G,X) is a conseqence of the theory for tori. Since finite étale covers are defined over finite algebraic extensions, one sees immediately that I(G,X) is defined over some number field, as are the Hecke correspondences on I(G,X). One can then replace the cocycle
for Aut(**C**) by a continuous cocycle on the Galois group of the algebraic closure of **Q**. A complete argument may be given elsewhere.

NOTE ADDED MARCH 21, 2008: After rereading Shimura's original proof of the existence of canonical models using cocycles on Aut(**C**) [Shimura, *Annals of Math*.**, 83** (1966) 294-338] in the light of its reformulation by Varshavsky [Appendix to *Selecta Math*., **8** (2002) 283-314], I am now convinced that the argument in (3.6.7) is essentially correct.

The argument proceeds by constructing a cocycle on Aut(**C**) with values in **G**m that is shown to be effective for descending to an appropriate reflex field an automorphic vector bundle on the Shimura variety attached to a torus. It thus necessarily satisfies the required continuity property. All that is missing from the proof is acknowledgment of of this requirement.

[15] Harris, M., Phong, D. H.: Cohomologie de Dolbeault à croissance logarithmique à l'infini. *C. R. Acad. Sci. Paris* **302**, 307-310 (1986).

José Ignacio Burgos pointed out in 1997 that the argument in Griffiths-Harris, used to extend the Poincaré Lemma with logarithmic singularities from the one-dimensional case to the general case, does not apply in the present situation. Briefly, the Dolbeault complex defined in this paper consists of forms ω which, together with their antiholomorphic derivatives, satisfy logarithmic growth conditions in the neighborhood of a divisor with normal crossings. However, the Griffiths-Harris argument introduces additional holomorphic derivatives, which may not belong to the original complex. The quotation should have been of the argument used by Borel in reference [1], which is based on integration rather than differentiation.

As noted in [19], and as observed independently by Burgos, one can actually reprove the one-dimensional Poincaré lemma with logarithmic singularities for forms all of whose derivatives, holomorphic as well as anti-holomorphic, satisfy the growth conditions; this is even necessary if one wants to obtain Lie algebra cohomology complexes to calculate the cohomology of Shimura varieties. A complete proof of this fact, and the correct deduction of the higher-dimensional case, was published in [42], in response to Burgos' comment. The thesis of Jun Su also contains a complete and correct proof.

[17]   Harris, M.: Arithmetic of the oscillator representation, manuscript (1987), see this page.

[21] Harris, M.: Period invariants of Hilbert modular forms, I: Trilinear differential operators and L-functions, in J.-P. Labesse and J. Schwermer, eds., Cohomology of Arithmetic Groups and Automorphic Forms, Luminy, 1989, *Lecture Notes in Math.*, **1447**, 155-202 (1990).

The last section of this article assumes the extension of the techniques of [22] to general totally real fields. At the time of publication, I was under the mistaken impression that the Siegel-Weil formula for the central value of the Eisenstein series, proved by Kudla and Rallis, extended in a simple way to the symplectic similitude group GSp(6). In fact, the extension proposed in [22] only works over **Q**. A correct Siegel-Weil formula for similitude groups is proved in [49]. Thus the proofs in this article are now complete.

Lemma 1.4.3 is stated for Hilbert modular forms of all weights, but should only have been stated for forms all of whose weights are at least 2. No proof is given but the proof in [20] is valid under this restriction.

[26] Harris, M., Soudry, D., Taylor, R.: l-adic representations attached to modular forms over an imaginary quadratic field, I: lifting to GSp(4,**Q**), *Inventiones Math.*, **112**, 377-411 (1993).

On p. 410, lines 2-3, we claim to have constructed supercuspidal representations of GSp(4) over a p-adic field that were missed by Vignéras in her article [V]. Dipendra Prasad pointed out that these supercuspidal representations, and the corresponding representations of the Weil group, were actually constructed in [V] in a different matrix representation.

[27] Harris, M.: L-functions of 2 by 2 unitary groups and factorization of periods of Hilbert modular forms, *J. Am. Math. Soc.* **6**, 637-719, (1993).

The relation of CM periods to special values of L-functions of Hecke characters, obtained in general by Blasius, is quoted on numerous occasions in this article. Unfortunately, it is quoted here, as in the appendix to [22], with a sign mistake. The final formulas are indifferent to the choice of sign, so no harm is done. The mistake is corrected in the introduction to [35], whose results depend on the correct choice of sign.

[34] Harris, M.: Supercuspidal representations in the cohomology of Drinfel'd upper half spaces; elaboration of Carayol's program, *Inventiones Math.* **129**, 75-119 (1997).

The correction character, denoted $\nu(G\pi)$ on p. 100, is calculated incorrectly on p. 101. The correct calculation is given on p. 181 of [37], where the sign convention of [34] is also replaced by one consistent with the conventions of the book of Rapoport and Zink.

[35] Harris, M.: L-functions and periods of polarized regular motives, *J.Reine Angew. Math.***483**, 75-161 (1997).

The main result on special values of L-functions of automorphic forms on unitary Shimura varieties refers to an unpublished calculation of archimedean zeta integrals, due to P. Garrett (Lemma 3.5.3). Garrett has since written up this calculation in a more general setting and his results are included in the same volume as [53].

[38] Harris, M.: Cohomological automorphic forms on unitary groups, I: rationality of the theta correspondence, *Proc. Symp. Pure Math,* **66.2**, 103-200 (1999).

A great many misprints were discovered while preparing the sequel [55]. There were also a few substantial mathematical errors. These were all corrected in the introduction to [55].

[40] Harris, M., Tilouine, J.: p-adic measures and square roots of triple product L-functions, *Math. Ann.*, **320**, 127-147 (2001).

Darmon and Rotger found a different formula for the corrected Euler factor at p in Proposition 2.2.2. There must be an error in our (elementary) calculation, but we have not yet been able to find it.

[44] Harris, M.: Local Langlands correspondences and vanishing cycles on Shimura varieties, Proceedings of the European Congress of Mathematics, Barcelona, 2000; *Progress in Mathematics*, **201**, Basel: Birkhaüser Verlag, 407-427 (2001).

Eva Viehmann found a mistake in the statement of Proposition 4.1 (ii), which means that Conjecture 5.2 needs to be corrected. The statements seem to be all right for split groups but not in the general case. Viehmann has proposed a corrected version. See item [51] below.

[49] Harris, M.: Occult period invariants and critical values of the degree four L-function of GSp(4) in H. Hida, D. Ramakrishnan, F. Shahidi, eds.,
Contributions to automorphic forms, geometry, and number theory (collection in honor of J. Shalika's 60th birthday), 331-354 (2004).

Remark 6.7 of the article "Higher Hida theory and p-adic L-functions" by Loeffler, Pilloni, Skinner, and Zerbes points out, diplomatically, that the calculation of the pairing in the proof of Proposition 1.10.3 is not correct in general. The authors of that article propose a more complicated but undoubtedly corrrect construction of the pairing that involves applying differential operators to the cohomology class on the Siegel modular variety as well as to the Eisenstein classes.

[51] Harris, M.: The Local Langlands correspondence: Notes of (half) a course at the IHP, Spring 2000, in J. Tilouine, H. Carayol, M. Harris, M.-F. Vignéras, eds., Formes Automorphes, *Astérisque*, **298**, 17-145 (2005) .

The mistake in [44] arises from an incorrect argument on pp. 130-131 of this article. Viehmann has published a corrected version in a joint paper with Rapoport. I hope to revise the calculation of the global Galois representation as a sum of contributions of individual strata.

[69] Harris, M.: Beilinson-Bernstein localization over **Q** and periods of automorphic forms, ***International Math. Research Notices***, **2013**, 2000-2053 (2013). Erratum, doi:10.1093/imrn/rny043

Fabian Januszewski pointed out a group of related errors in this article, as well as an ambiguity and a few arguments based on constructions for which there are not references in the literature. The main point is that some of the modules only have models over finite extensions of their fields of coefficients. This has no bearing on applications to special values of L-functions, but the statements have been corrected in the erratum.