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**The Breuil-Mézard conjecture for non-scalar split residual representations. (La conjecture de Breuil-Mézard pour les représentations résiduelles scindées non scalaires.)** (English. French summary) [Zbl 1334.11041](#)

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Let  $p > 5$  be a prime number, let  $E$  be a sufficiently large finite extension of  $\mathbb{Q}_p$ . The authors give an essentially local proof of the cycle-theoretic version of the Breuil-Mézard conjecture on the equality between the Hilbert-Samuel multiplicity of a certain locus of deformations of a  $p$ -adic Hodge type  $(k, \tau, \psi)$  with values in  $\mathrm{GL}_2(E)$  and a certain sum of representation-theoretic multiplicities of  $\mathrm{GL}_2(\mathbb{Z}_p)$  associated with  $(k, \tau, \psi)$ .

The proof consists of two parts: first following the strategy in [*V. Paškūnas*, *Duke Math. J.* 164, No. 2, 297–359 (2015; [Zbl 1376.11049](#))], the authors prove the analogous statement for multiplicities of pseudo-deformation rings; then the conjecture is deduced by comparing multiplicities of the deformation rings  $R^{\mathrm{ps},\psi}$ ,  $R_{\mathfrak{q}_i}^{\mathrm{peu},\psi}$  and  $\widehat{R}_{\mathfrak{p}_i}^{\mathrm{ver},\psi}$  over various prime ideals  $\mathfrak{p}_i$  of  $R^{\mathrm{ver},\psi}$ . As a consequence, this allows the authors to remove the local restriction in the proof of the Fontaine-Mazur conjecture in [*M. Kisin*, *J. Am. Math. Soc.* 22, No. 3, 641–690 (2009; [Zbl 1251.11045](#))].

Reviewer: [Shuyang Cheng \(Chicago\)](#)

**MSC:**

- 11F80 Galois representations
- 11S37 Langlands-Weil conjectures, nonabelian class field theory
- 11F85  $p$ -adic theory, local fields
- 22E50 Representations of Lie and linear algebraic groups over local fields

[Cited in 4 Documents](#)

**Keywords:**

Breuil-Mézard conjecture; deformation rings; Galois representations;  $p$ -adic local Langlands correspondence

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