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Nets for fishing absolute Galois pro-p groups

Seminar on Arithmetic Geometry and Algebraic Groups

Abstract. Let p be a prime. One of the major open problems in Galois theory is the characterization of pro-p groups which occur as absolute Galois groups of fields. The proof of the Norm Residue Theorem (2011) provided Galois theorists new cohomological tools for investigating this problem.

In a joint work with S. Blumer and Th.S. Weigel, we characterize absolute Galois pro-p groups within the family of *oriented right-angled Artin pro-p groups* (oriented pro-p RAAGs for short), which is an extremely rich family of pro-p groups (containing pro-p completions of right-angled Artin groups): we show that pro-p RAAGs occuring as absolute Galois groups are of elementary type — i.e., they may be constructed starting from free pro-p groups and employing free products and certain semidirect products. This result extends a recent result of I. Snopce and P.A. Zalesskii (cf. [3]), and it provides evidence to I. Efrat's *Elementary Type Conjecture* (cf. [2]). We obtain our result employing two cohomological properties, the *Bloch-Kato property* and *1-cyclotomicity*, which happen to be equivalent for oriented pro-p RAAGs (and which will be introduced during the talk), while Massey products (another tool in Galois cohomology which attracted a lot of interest in recent years) fail to detect oriented pro-p RAAGs occuring as absolute Galois groups.

References

[1] S. Blumer, C. Quadrelli and Th.S. Weigel, Oriented right-angled Artin pro-p groups and absolute Galois groups, in preparation.

[2] I. Efrat, Orderings, valuations, and free products of Galois groups, *Sem. Structure Algébriques Ordonnées*, Univ. Paris VII (1995).

[3] I. Snopce and P.A. Zalesskii, Right-angled Artin pro-p groups, *Bull. London. Math. Soc.*, to appear, available at `arXiv:2005.01685`.