

characteristics, parametrized by reals, for each one of the following six types: uniformity and covering numbers of Yorioka ideals as well as both kinds of localization and anti-localization cardinals, respectively. This answers several open questions from Klausner and Mejía (*Arch. Math. Logic* 61 (2022), pp. 653–683).

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FRANCESCO PAOLO GALLINARO, *Around Exponential-Algebraic Closedness*, University of Leeds, UK, 2022. Supervised by Vincenzo Mantova. MSC: Primary 03C65. Secondary 11F03, 11L99, 14K12. Keywords: abelian varieties, algebraic groups, Exponential-Algebraic Closedness, exponential function, modular  $j$ -function, quasiminimality.

### Abstract

We present some results related to Zilber's Exponential-Algebraic Closedness Conjecture, showing that various systems of equations involving algebraic operations and certain analytic functions admit solutions in the complex numbers. These results are inspired by Zilber's theorems on raising to powers.

We show that algebraic varieties which split as a product of a linear subspace of an additive group and an algebraic subvariety of a multiplicative group intersect the graph of the exponential function, provided that they satisfy Zilber's freeness and rotundity conditions, using techniques from tropical geometry.

We then move on to prove a similar theorem, establishing that varieties which split as a product of a linear subspace and a subvariety of an abelian variety  $A$  intersect the graph of the exponential map of  $A$  (again under the analogues of the freeness and rotundity conditions). The proof uses homology and cohomology of manifolds.

Finally, we show that the graph of the modular  $j$ -function intersects varieties which satisfy freeness and broadness and split as a product of a Möbius subvariety of a power of the upper-half plane and a complex algebraic variety, using Ratner's orbit closure theorem to study the images under  $j$  of Möbius varieties.

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RAHMAN MOHAMMADPOUR, *New methods in forcing iteration and applications*, Institut de Mathématiques de Jussieu-Paris Rive Gauche, Université de Paris, Paris, France, 2020. Supervised by Boban Veličković. MSC: 03E05, 03E35, 03E40, 03E55, 03E57. *Key words and phrases.* guessing model, approachability ideal, PFA, higher forcing axioms, Magidor models, side conditions.

### Abstract

**The Theme.** Strong forcing axioms like Martin's Maximum give a reasonably satisfactory structural analysis of  $H(\omega_2)$ . A broad program in modern Set Theory is searching for strong forcing axioms beyond  $\omega_1$ . In other words, one would like to figure out the structural properties of taller initial segments of the universe. However, the classical techniques of