

THE PROJECTIVE UNITARY IS ALGEBRAICALLY DETERMINED POLISH GROUP

ALEXANDRU G. ATIM¹ AND ROBERT R. KALLMAN²

ABSTRACT. The purpose of this paper is to prove that, if \mathcal{H} is a separable complex Hilbert space, the projective unitary group is algebraically determined Polish group.

REFERENCES

- [1] A.G. Atim and R.R. Kallman, *The infinite unitary and related groups of algebraically determined Polish groups*, Topology Appl. **159** (2012), 2831-2840.
- [2] M. Gotô, *A theorem on compact semi-simple groups*, J. Math. Soc. Japan **1(3)** (1949), 270-272.
- [3] P. R. Halmos, *A Hilbert Space Problem Book*, D. Van Nostrand Company, Princeton, New Jersey, (1967).
- [4] F. Hausdorff, *Über innere Abbildungen*, Fundamenta Mathematicae **23** (1934), 279-291.
- [5] W. Hodges, I. Hodkinson, D. Lascar, and S. Shelah, *The small index property for ω -stable ω -categorical structures and for the random graph*, J. London Math. Soc. **s2-48 (2)** (1993), 204-218.
- [6] R. R. Kallman, *The topology of compact simple Lie groups is essentially unique*, Advances in Mathematics **12** (1974), 416-417.
- [7] R. R. Kallman, *A uniqueness result for topological groups*, Proc. Amer. Math. Soc., **54** (1976), 439-440.
- [8] R. R. Kallman, *A uniqueness result for the infinite symmetric group*, Studies in Analysis, Advances In Mathematics Supplementary Studies **4** (1978), 321-322.
- [9] R. R. Kallman, *A uniqueness results for a class of compact connected groups*, Contemporary Mathematics **26** (1984), 207-212.
- [10] R. R. Kallman, *Uniqueness results for the $ax + b$ group and related algebraic objects*, Fundamenta Mathematicae **12** (1984), 255-262.
- [11] R. R. Kallman, *Uniqueness results for groups of measure preserving transformations*, Proc. Amer. Math. Soc. **20 (1)** (1985), 87-90.
- [12] R. R. Kallman, *Uniqueness results for homeomorphism groups*, Trans. Amer. Math. Soc. **295** (1986), 389-396.
- [13] R. R. Kallman, and A. P. McLinden, *The Poincaré and Related Groups are Algebraically Determined Polish Groups*, Collectanea Mathematica, **61** (2010), 337-352.
- [14] A. S. Kechris, *Classical Descriptive Set Theory*, Springer-Verlag, New York (1995).
- [15] A. S. Kechris, and C. Rosendal, *Turbulence, amalgamation and generic automorphisms of homogeneous structures*, Proc. Lond. Math. Soc. **94 (2)** (2007), 302-350.
- [16] J. Kittrell, T. Tsankov, *Topological properties of full groups*, Ergodic Theory Dynam. Systems **30 (2)** (2010), 525-545.
- [17] G. W. Mackey, *Borel structure in groups and their duals*, Transactions of the American Mathematical Society **85 (1)** (1957), 134-165.
- [18] C. Rosendal, *Automatic continuity in homeomorphism groups of compact 2-manifolds*, Israel J. Math. **166** (2008), 349-367.
- [19] C. Rosendal, *Automatic continuity of group homomorphisms*, Bull. Symbolic Logic **15 (2)** (2009), 184-214.
- [20] C. Rosendal, and S. Solecki, *Automatic continuity of homomorphisms and fixed points on metric compacta*, Israel J. Math. **162** (2007), 349-371.

2010 *Mathematics Subject Classification.* 22A05.

Key words and phrases. Topological Groups, Polish Groups, Projective Unitary Groups.

- [21] T. Tsankov, *Automatic Continuity for the Unitary Group*, Proc. Amer. Math. Soc. **141** (10) (2013), 3673-3680.
- [22] B. L. van der Waerden, *Stetigkeitssätze für halbeinfache Liesche gruppen*, Mathematische Zeitschrift **36** (1933), 780-786.

Received 13 June 2023

¹ COLUMBIA COLLEGE, 1301 COLUMBIA COLLEGE DRIVE, COLUMBIA, SOUTH CAROLINA 29203
Email address: ¹ aatim@columbiasc.edu, ² kallman.robert@gmail.com