THE IRREDUCIBLE SIX-DIMENSIONAL COMPLEX REPRESENTATIONS OF $\mathrm{Aut}(F_2)$ THAT ARE NONTRIVIAL ON F_2

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Abstract. Denote by Φ_2 the automorphism group of the free group F_2 on two generators. We classify the irreducible 6-dimensional complex representations of Φ_2 whose restriction to F_2 is nontrivial. J. Dyer, E. Formanek, and E. Grossman have shown how the Bürau representation of the braid group B_4 gives rise to a one-parameter family of irreducible 6-dimensional representations of Φ_2. The faithfulness question for these and some other closely related representations of Φ_2 is open. Our classification shows that all other 6-dimensional representations of Φ_2 are not faithful.