

THE OUTER AUTOMORPHISM GROUPS OF THE PROFINITE BRAID GROUPS

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Let $n > 3$ be an integer. Write B_n for the (Artin) braid group on n strings. In 1980's, J. Dyer and E. Grossman proved that any nontrivial outer automorphism of B_n arises from the involution (of order two). In this talk, we will determine the outer automorphism group of the profinite completion $\widehat{B}_n$ of B_n . This is joint work with H. Nakamura. A key object in this talk is a natural outer action of the Grothendieck-Teichmüller group $\widehat{\mathrm{GT}}$ on $\widehat{B}_n$ (defined by V. Drinfeld and Y. Ihara), where $\widehat{\mathrm{GT}}$ is a profinite group defined as a certain explicit subgroup of the automorphism group of a free profinite group of rank two. One of the most interesting properties of $\widehat{\mathrm{GT}}$ is that there exists a natural injection (which is conjecturally an isomorphism) from the absolute Galois group of the field of rationals into $\widehat{\mathrm{GT}}$. In our proof, it is important to first focus on a subquotient $\widehat{\mathcal{P}}_n$ of $\widehat{B}_n$ and apply a computation (which was previously obtained by the speaker in joint work with Y. Hoshi and S. Mochizuki) of the outer automorphism group of $\widehat{\mathcal{P}}_n$. In this talk, we will also explain this computation, in which (combinatorial) anabelian results play important roles.