VANISHING RESULTS FOR THE COHOMOLOGY OF COMPLEX TORIC HYPERPLANE COMPLEMENTS

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Abstract: Suppose $\mathcal{R}$ is the complement of an essential arrangement of toric hyperlanes in the complex torus $(\mathbb{C}^*)^n$ and $\pi = \pi_1(\mathcal{R})$. We show that $H^*(\mathcal{R}; A)$ vanishes except in the top degree n when A is one of the following systems of local coefficients: (a) a system of nonresonant coefficients in a complex line bundle, (b) the von Neumann algebra $\mathcal{N}\pi$, or (c) the group ring $\mathbb{Z}\pi$. In case (a) the dimension of H^n is $|e(\mathcal{R})|$ where $e(\mathcal{R})$ denotes the Euler characteristic, and in case (b) the nth ℓ^2 Betti number is also $|e(\mathcal{R})|$.