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A vanishing result for the first twisted cohomology of affine varieties and applications to line arrangements

(Joint work with A. Dimca and M. Yoshinaga)

Let S be a smooth proper complex variety of dimension ≥ 2 and $D = \sum_{i=1}^n D_i$ a divisor on S (D_i irreducible). Consider a rank one local system \mathcal{L} on $U = S \setminus D$, with monodromy $t_i \in \mathbb{C}^\times$ around D_i . We give a general vanishing result for the first twisted cohomology group $H^1(U, \mathcal{L})$, generalizing a result due to Cohen-Dimca-Orlik. Then we give some applications in the context of hyperplane arrangement, namely local system cohomology of line arrangement complements. In particular, we will apply our result to determine the monodromy action on the Milnor fiber of two hyperplane arrangements: the Ceva arrangement and the exceptional reflection arrangement of type G_{31} .