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*Depth and cohomological detection in invariant theory*

Let  $G$  be a finite group and  $k$  a field. If the characteristic of  $k$  divides the order of  $G$ , then the ring of invariants  $k[V]^G$  is usually not Cohen–Macaulay. One can often learn much about the structure of  $k[V]^G$  by studying the annihilator ideals in the  $k[V]^G$ -modules  $H^i(G, k[V])$  for  $i > 0$ . In this talk we will show how detection conditions on  $H^i(G, k[V])$  give upper bounds for the depth of  $k[V]^G$ . We will also give necessary and sufficient conditions, based on cohomology, for the depth of  $k[V]^G$  to be as small as possible.