Group actions on rings and the Cech complex

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We have previously shown that, when a finite group $G$ acts on a polynomial ring $S$ over a finite field $k$, only a finite number of isomorphism classes of indecomposable $kG$-modules occur as summands of $S$. We have also shown that the regularity of the invariant subring $S^G$ is at most 0, which has various consequences, for example that $S^G$ is generated in degrees at most $n(|G| - 1)$ (provided $n, |G| \geq 2$). Both of these results depend on the Structure Theorem of Karagueuzian and myself, which is proved by means of a long and complicated calculation. The aim of this talk is to sketch a proof that uses a more conceptual method.