ON THE SECONDARY COHOMOLOGY OF MOMENT-ANGLE COMPLEXES

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Due to the results of Baskakov, Buchstaber, Panov, and Franz, cohomology algebra $H^*(\mathcal{Z}_K; \mathbf{k})$ of a moment-angle complex $\mathcal{Z}_K$ over a field $\mathbf{k}$ can be described using Hochster decomposition of a Tor-algebra of the Stanley-Reisner ring $\mathbf{k}[K]$ into a direct sum of reduced simplicial cohomology groups of all full subcomplexes in K.

In this talk we introduce a differential d' acting on the Hochster decomposition leading us to the (bigraded) secondary cohomology $HH^*(\mathcal{Z}_K) = H^*[H^*(\mathcal{Z}_K), d']$ of $\mathcal{Z}_K$, which is also a combinatorial invariant of K. We present certain examples of its computation and describe the class of simplicial complexes for which the secondary cohomology of moment-angle complexes equals either $\mathbf{k}$, or $\mathbf{k} \oplus \mathbf{k}$. Furthermore, we show that $HH^*(\mathcal{Z}_K)$ is invariant under the operation of doubling K at its vertex. The last property opens a way to applications of toric topology in topological data analysis.

This talk is based on joint works with Anthony Bahri, Taras Panov, Jongbaek Song, and Donald Stanley.

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