2-truncated cubes and their toric spaces

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To any convex simple n-dimensional polytope P with m facets one can associate its moment-angle manifold $\mathcal{Z}_P$ – one of the main objects of study in toric topology. It was introduced firstly by M.Davis and T. Januszkiewicz as a generalization of the notions of a quasitoric manifold and a projective toric manifold. V. Buchstaber and T. Panov proved that $\mathcal{Z}_P$ is a smooth $(m+n)$-dimensional closed 2-connected manifold with a compact torus T^m action, whose orbit space is homeomorphic to the polytope P itself. The topology of $\mathcal{Z}_P$ is governed by the face lattice of P and can be very complicated.

In our talk we shall introduce several equivalent definitions of $\mathcal{Z}_P$ arising in toric and symplectic geometry, their relation to smooth toric varieties, and then discuss additive structure and Massey products in cohomology of moment-angle manifolds $\mathcal{Z}_P$ when P is a 2-truncated cube, that is a consecutive cut of only codimension 2 faces starting with a cube. V. Buchstaber and V. Volodin showed that any flag nestohedron can be realized as a 2-truncated cube and proved Gal's conjecture on γ-vectors for them. We introduce a family of n-dimensional 2-truncated cubes P, such that there is a nontrivial n-fold Massey product in cohomology of the moment-angle manifold $\mathcal{Z}_P$ for any $n \geq 2$ and present our family of 2-truncated cubes as flag nestohedra. We shall also discuss the additive structure in $H^*(\mathcal{Z}_P)$ in relation with a problem of identifying multiplicative generators of loop homology for $\mathcal{Z}_P$ and Serre's problem on rationality of Poincaré series for local Noetherian rings.

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