ON CERTAIN TORIC SPACES ARISING FROM FLAG SIMPLE POLYTOPES

IVAN LIMONCHENKO

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. This manifold appeared firstly in the work of 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, and cohomology algebra of $\mathcal{Z}_P$ is isomorphic to the Tor-algebra $Tor_{k[v_1,\ldots,v_m]}(k[P],k)$ of P over a polynomial algebra, when k is a commutative ring with a unit. The topology of $\mathcal{Z}_P$ is governed by the face lattice of P and can be very complicated. In particular, determining Massey products in the Tor-algebras above is related to computation of Poincaré series for Noetherian local rings being studied since 1960s.

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 Betti numbers, integral torsion, higher Massey products in cohomology and rational formality 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, in particular, a flag nestohedron. The latter class of simple polytopes includes the family of graph-associahedra due to M.Carr and S.Devadoss, studied intensively in representation theory, cluster algebras and convex geometry.

School of Mathematical Sciences, Fudan University, Shanghai, 200433, P.R. China

E-mail address: ilimonchenko@gmail.com