南京2016青年拓扑学家论坛

2016/08/23 – 2016/08/26 南京大学数学系

报告人：王博潼（University of Wisconsin, Madison）

题目：Global analog of the monodromy theorem

摘要：Let $f : (\mathbb{C}^n, 0) \to (\mathbb{C}, 0)$ be a germ of an analytic function, and let ϵ be a nonzero complex number whose absolute value is sufficiently small. Then $f^{-1}(\epsilon)$ is called the Milnor fiber of f. The classical monodromy theorem states that all eigenvalues of the monodromy action on the homology groups of the Milnor fiber are roots of unity. Moreover, it gives an upper bound of the sizes of all the Jordan blocks of the monodromy action.

In this talk, I will discuss a recent global analog of the local monodromy theorem. Let X be a smooth complex quasi-projective variety. Suppose there exists a fiber bundle map $X \to S^1$ with fiber F. Then we obtain the same result on the monodromy action of the homology groups of F. Furthermore, if X is projective (or more generally a compact Kahler manifold), then we will show that the monodromy action is semisimple. Even when X does not allow any bundle map to S^1, we can achieve similar result using cyclic covers given by any surjective map $H_1(X, \mathbb{Z}) \to \mathbb{Z}$.

报告人：Alastair Darby （复旦大学）

题目：Algebraic PL-Invariants

摘要：We consider looking for algebraic PL-invariants of manifolds using the notion of cluster algebras. This is inspired by the work of Fomin, Shapiro and Thurston.

报告人：李平（同济大学）

题目：On the spectral rigidity of complex projective spaces

摘要：A classical question in spectral geometgry is, for a fixed p, whether a compact Kaehler manifold whose eigenvalues of Laplacian on p-forms are the same as those of a standard complex projective space is holomorphically isometric to it. We affirmatively solve this problem for almost all even p in all dimensions. We also clarify in this paper some gaps in previous literature on this question, among which one is related to the volume estimate of Fano Kaehler-Einstein manifolds.

报告人：叶圣奎（西交利物浦大学）

题目：Isomorphism conjectures in K-theory and CAT(0) groups

摘要：In this talk, we will review the formulation of Farrell-Jones and Baum-Cones conjectures in algebraic and operator K-theory. As applications of CAT(0) groups, we will show that these conjectures hold for all groups if and only if they hold for all acyclic groups. Furthermore, we will also show that the assembly maps are isomorphic for any group if and only if the assembly maps are injective for any group. This is a joint work with Crichton Ogle.

报告人：蔡力（中科院数学所）

题目：On the topology of a small cover

摘要：In this talk I will introduce our recent work on the topology of small covers: we give a PL handle decomposition of a small cover associated to a shellable complex, which coincides with the one given by Davis and Januszkiewicz in the smooth case, and then study its integral cohomology groups. This is a joint work with Suyoung Choi.

报告人：代伟（河北师范大学）

题目：Small covers over a product of a dual of a cyclic polytope with simplices

摘要：A small cover is a closed manifold with a locally standard $(\mathbb{Z}_2)^n$-action such that its orbit space is a simple convex polytope. For instance, the real projective space $\mathbb{R}P^n$ with a natural $(\mathbb{Z}_2)^n$-action is a small cover over an n-simplex. It is interesting to study the equivariant topology of the small cover through the combinatorial structure of the orbit space. The objective of this talk is to calculate the number of D-J equivalence classes and equivariant homeomorphism classes of all small covers over a product of a dual of a cyclic polytope with simplices.

报告人：王格非（南开大学）

题目：A moment-angle manifold whose cohomology is not torsion free

摘要：In this talk I will introduce a methord to constract torsions in the cohomology groups of moment-angle manifolds. As an example, I will introduce a moment-angle manifold corresponding to the triangulation of a 4-dimensional sphere whose cohomology group has two torsion.

报告人：范飞飞（中科院数学所）

题目：Introduction to a PL invariant: homeology group and its application

摘要：For every simplicial complex K, we define the bigraded homeology group associated to K and prove that these groups are PL homeomorphism invariants of polyhedra, while they are not homotopy invariants. So these groups can reflect some information that (co)homology groups can not tell. Applications shall be presented for various examples and some classical results in algebraic topology. This is a joint work with Qibing Zheng（郑弃冰）.

报告人：王慰（上海海洋大学）

题目：On the Montgomery-Yang Correspondence

摘要：In 1966, D.Montgomery and C.T. Yang constructed a one-to-one correspondence between the group of differentiably knotted 3-spheres in 6-sphere and set of homotopy $\mathbb{C}P^3$, i.e.:

$$\Phi : \Sigma^{6,3} := \{i : S^3 \hookrightarrow S^6\} \longrightarrow \Pi_1^6 := \{M | M \simeq \mathbb{C}P^3\}.$$

In this talk, we will first recall their original construction. Second, we will discuss some modifications of their correspondence in dimension 6. Finally, we will say something about the high dimensional generalization of this correspondence.

报告人：周斌（北京大学）

题目：Canonical metrics and algebro-geometric stabilities of toric manifolds

摘要：The existence of canonical metrics is a fundamental problem in Kahler geometry. According to Yau-Tian-Donaldson conjecture, the existence of canonical metrics is related to various algebro-geometric stabilities in sense of geometric invariant theory. In this talk, I will give an introduction on the canonical metrics and algebro-geometric stabilities, especially Chow stability and K-stability on toric manifolds.

报告人：Naoto Yotsutani （复旦大学）

题目：K-polystable polarized toric surfaces with reductive automorphism group

摘要：Reductivity of the automorphism group is the first important obstruction for the existence of Kaehler-Einstein metrics on Fano manifolds due to Matsushima. In this talk, we show that the automorphism group of a K-polystable toric surface is reductive. In order to deal with the automorphism group of a polarized toric variety, we shall use column structure on the lattice polytope which was investigated by Bruns and Gubeladze. This talk is based on the joint work with Tomoyuki Hisamoto (Nagoya University).

报告人：王彦英（河北师范大学）

题目：A digital topology and its applications

摘要：In this talk, we introduce a definition of a digital topology and discuss its applications to digital image analysis. We are interested in relations between digital connectedness and topological connectedness for digital images, and connectedness-preserving maps, etc.

报告人：江怡（清华大学数学中心）

题目：Rigidity and characteristic classes of smooth bundles with nonpositively curved fibers

摘要：In this talk, we will present vanishing results for the generalized Miller-Morita-Mumford classes of some smooth bundles whose fiber is a closed manifold that supports a nonpositively curved Riemannian metric. Moreover, under some extra conditions, the vertical tangent bundle is topologically rigid. This is a joint work with M. Bustamante and F.T. Farrell.

报告人：陈海苗（北京工商大学）

题目：The Dijkgraaf-Witten invariants of Seifert 3-manifolds with orientable bases

摘要：Fix a class $[\omega] \in H^3(B\Gamma; U(1))$ with Γ a finite group. For an oriented 3-manifold M, the *Dijkgraaf-Witten* invariant of M is

$$Z(M) = \frac{1}{\#\Gamma} \cdot \sum_{\Phi \in \hom(\pi_1(M), \Gamma)} \langle F(\Phi)^*[\omega], [M] \rangle,$$

where $F(\Phi) : M \to B\Gamma$ is a mapping inducing Φ which is unique up to homotopy, and $\langle -, - \rangle$ is the paring $H^3(M; U(1)) \times H_3(M; \mathbb{Z}) \to U(1) \subset \mathbb{C}$. We derive a formula for $Z(M)$ when M is a Seifert 3-manifold with orientable base; it is expressed using irreducible projective characters of centralizers of Γ.

报告人：胡锡俊（山东大学）

题目：Maslov指标理论，“迹”公式及N-体问题的稳定性问题

摘要：我们从N-体问题周期解的稳定性问题出发，简要介绍一下Maslov指标理论及“迹”公式的最新发展及其对拉格朗日轨道，“8”字型轨道的应用。

报告人：吴建春（苏州大学）

题目：Subgroups in direct products of compact surface groups

摘要：The subgroup structure of the direct product of compact surface groups is complicated. There are uncountable many non-isomorphic groups arise as such subgroups. Stallings and Bieri show that the full range of finiteness properties is to be found among these examples. In this talk, we will introduce some special subgroups, including Stallings' example, the Mihailova subgroup, fixed subgroups of automorphisms , etc. Some of the results are joint work with Enric Ventura and Qiang Zhang.

报告人：陈智（合肥工业大学）

题目：Generalized Lawrence-Krammer representations for Artin groups

摘要：The LK representation for braid group Bn are $n(n-1)/2$ dimensional linear representations with two parameters. These geometricly defined representations were proved to be faithful around 2000. later Cohen and Wales, Paris defined similar representations for finite type simply laced Artin groups, and any simply laced Artin groups. Around 2007, Marin defined GLK for any finite type Artin groups as monodromy of certain flat connection. It is a problem to write down the monodromy of these flat connections explicitly. In this talk we use certain algebraic method to get the explicit monodromy in the cases of odd dihedral type Artin groups, which could be the base to write down the GLK explicitly for all “oddly laced” Artin groups.

报告人：苏阳（中科院数学所）

题目：On 5-manifolds with free fundamental group

摘要：I will present a classification theorem of closed 5-manifolds with free fundamental group and torsion free second homotopy group. This result can be applied to links of 3-spheres in the 5-space. This is a joint work with Matthias Kreck.

报告人：郑芳婷（复旦大学）

题目：Boundary geometric condition extending property of some hyperbolic total-geodesic closed 3-manifolds

摘要：It is well known that an arbitrary closed 3-manifold can be realized as a boundary of a 4-manifold. However, for a hyperbolic total-geodesic closed (CHTG) 3-manifold M^3，the geometric condition can not be certainly extended (i.e It’ s not sure that the existence of a HTG 4-manifold M^4 s.t. $\partial M^4 = M^3$. In this talk , we will investigate a special family of manifold $M(\lambda, P^n)$ that derived from the line-glued 5-Lobell polytopes and characteristic functions. In this case the boundary geometric condition extending (GBCD) property can be depicted by “admissible coloring”. Furthermore, we have calculated a lower bound for $G(x) = \#\{M^3 \,|\, \partial M^4 = M^3$, M^3 is CHTG, M^4 is HTG, $\mathrm{vol}(M^3) \leq x\}$. Some interesting observations within our researching wok will also be displayed. This is a joint work with Jiming Ma（马继明）.