



Tsinghua Sanya International Mathematics Forum

(清华三亚国际数学论坛)

Workshop on Algebraic Lie Theory and Symplectic Geometry

March 21-25, 2016

No.100 Tsinghua Rd., Tianya District, Sanya, Hainan.

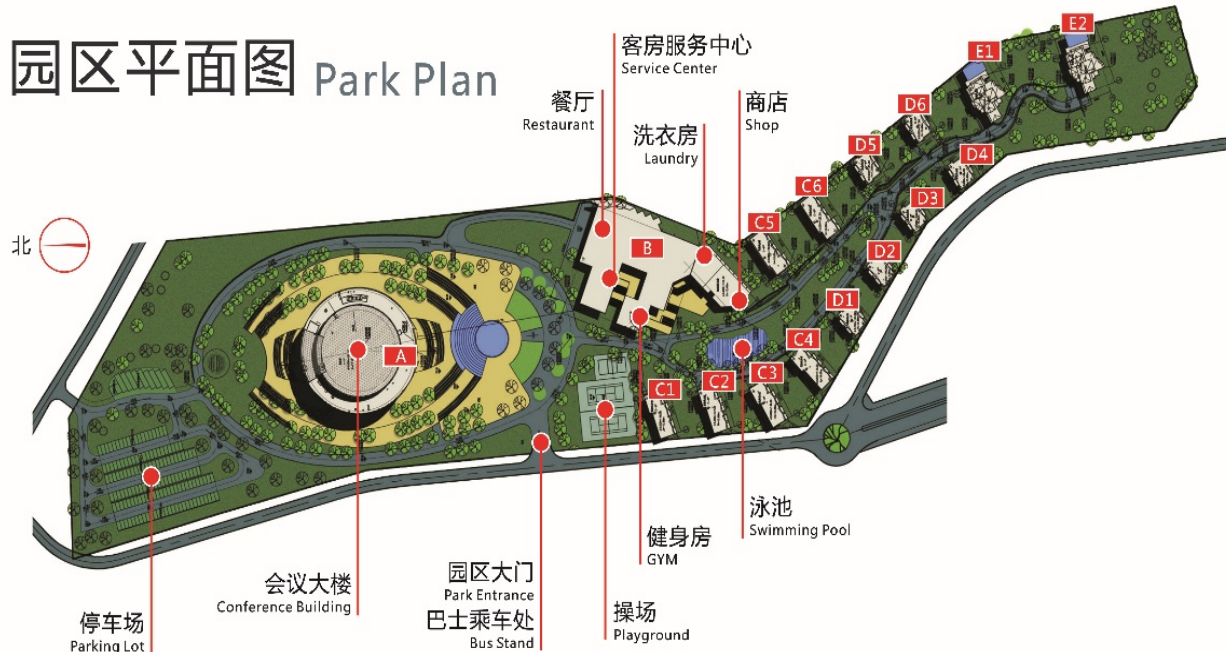
(海南省三亚市天涯区清华路100号)

Welcome to TSIMF

The facilities of TSIMF are built on a 23-acre land surrounded by pristine environment at Phoenix Hill of Phoenix Township. The total square footage of all the facilities is over 29,000 square meter that includes state-of-the-art conference facilities (over 10,000 square meter) to hold many international workshops simultaneously, two libraries, a guest house (over 10,000 square meter) and the associated catering facilities, a large swimming pool, gym and sports court and other recreational facilities.

Mathematical Sciences Center (MSC) of Tsinghua University, assisted by TSIMF's International Advisory Committee and Scientific Committee, will take charge of the academic and administrative operation of TSIMF. The mission of TSIMF is to become a base for scientific innovations, and for nurturing of innovative human resource; through the interaction between leading mathematicians and core research groups in pure mathematics, applied mathematics, statistics, theoretical physics, applied physics, theoretical biology and other relating disciplines, TSIMF will provide a platform for exploring new directions, developing new methods, nurturing mathematical talents, and working to raise the level of mathematical research in China.

园区平面图 Park Plan



Attention Please

Registration

Conference booklets, room keys and name badges for all participants will be distributed at the Registry. Please take good care of your name badge. It is also your meal card and entrance ticket for all events.

Dining Arrangements

All the meals are provided in the Chinese Restaurant (Building B1) according to the time schedule.

Breakfast	07:30-08:30
Lunch	12:00-13:00
Dinner	18:00-19:00

Shuttle Service

We have shuttle bus to take participants to the airport for your departure service. Please just feel free to contact Ms. Li Ye (叶莉) if you have any questions about transportation arrangement. Her cell phone number is (0086)139-7679-8300. We would provide transportation at the Haipo Square (海坡广场) of Howard Johnson for the participants who will stay outside TSIMF.

Shuttle Bus Arrangement

Mon (March 21)

- 09:00 Pick-up at the entrance of TSIMF to Haipo Square (海坡广场)
- 11:30 Back from Haipo Square (海坡广场) to TSIMF
- 18:30 Pick-up at the entrance of TSIMF to Haipo Square (海坡广场)
- 21:00 Back from Haipo Square (海坡广场) to TSIMF

Tue (March 22)

- 09:00 Pick-up at the entrance of TSIMF to Haipo Square (海坡广场)
- 11:30 Back from Haipo Square (海坡广场) to TSIMF
- 18:30 Pick-up at the entrance of TSIMF to Haipo Square (海坡广场)
- 21:00 Back from Haipo Square (海坡广场) to TSIMF

Wed (March 23)

- 09:00 Pick-up at the entrance of TSIMF to Haipo Square (海坡广场)
- 11:30 Back from Haipo Square (海坡广场) to TSIMF

Thi (March 24)

- 09:00 Pick-up at the entrance of TSIMF to Haipo Square (海坡广场)
- 11:30 Back from Haipo Square (海坡广场) to TSIMF
- 18:30 Pick-up at the entrance of TSIMF to Haipo Square (海坡广场)
- 21:00 Back from Haipo Square (海坡广场) to TSIMF

Fri (March 25)

- 09:00 Pick-up at the entrance of TSIMF to Haipo Square (海坡广场)
- 11:30 Back from Haipo Square (海坡广场) to TSIMF
- 18:30 Pick-up at the entrance of TSIMF to Haipo Square (海坡广场)
- 21:00 Back from Haipo Square (海坡广场) to TSIMF

Contact Information of Administration Staffs

Location of Conference Affair Office:

Room 203, Building B1

Location of Accommodation Affair Office

Room 200, Building B1

Accommodation Manager:

Ms. Li Ye 叶莉

Tel: 0086-139-7679-8300

E-mail: yeli@tsimf.cn

Emergency Contact:

Prof.Xuan Gao 高瑄

Tel: 0086-186-0893-0631

E-mail: gaoxuan@tsinghua.edu.cn

泳池管理规定

为了保障游泳爱好者的人身安全，请您务必遵守如下管理规定：

1. 安全第一，请仔细阅读泳池安全使用规定，了解各处水深的相关标识。
2. 请在开放时段进入泳池，非开放时间不得入水。
3. 有下列情形者，不得进入游泳池：（一）皮肤病、传染病、精神疾病或癫痫等疾病的患者。（二）无家长保护之儿童。（三）携带危险物品者。
4. 入水前要做好全身准备活动，游泳时需穿戴泳衣泳帽，不得在池中做可能产生伤害事故的动作。
5. 游泳者须爱护泳池及周边的各种设施设备，服从泳池管理人员的指挥，不得在泳池、岸边追逐打闹。
6. 初学者需佩戴游泳圈，并远离深水区。
7. 游泳中如发现身体不适，请停止游泳活动，立刻上岸。
8. 游泳区杜绝各种不安全、不文明、不讲卫生的行为。

清华三亚国际论坛管理中心

2014年7月

Pool Rules

Use pool at your own risk. There is no lifeguard on duty. We are not responsible for accidents or injuries.

1. Safety first. Please obey all safety regulations.
2. Pool hours must be followed.
3. Do not swim if you are suffering from skin sores, infections, mental illness or epilepsy. **Unaccompanied children are not allowed to swim.** Do not take any dangerous things into the pool.
4. Please take shower before entering the pool. Appropriate clothing must be worn at all times.
5. Obey instructions of the pool manager. No running or horseplay.
6. **Beginners should wear swimming rings, and stay away from the deep water area.**
7. If you feel unwell, please get out of the pool immediately.
8. No diving, running, pushing and horseplay. Please keep the pool clean.

Tsinghua Sanya International Forum Management Center

July, 2014



Dear Participants,

Thank you for your visit. As you can see, everything is new at TSIMF. There must be many things need upgrading and modification. We welcome your comments, in Chinese or English, in the following.

Thank you.

TSIMF Management Team

Suggestions & Comments:

Please leave it on the night table when you check out.

Program of "Workshop Algebraic Lie Theory and Symplectic Geometry" (March 21-25, 2016, TSIMF)

Time & Date	March 21	March 22	March 23	March 24	March 25
09:30-10:30	Eric Vasserot	Hiraku Nakajima	Michela Varagnolo	Zhiwei Yun	Peter McNamara
10:30-11:00	Tea Break (Workshop Photo)	Tea Break	Tea Break	Tea Break	Tea Break
11:00-12:00	Sian Nie	Fan Xu	Peng Shan	Yu Qiu	Raphael Rouquier
12:00-14:30	Lunch Break				
14:30-15:30	Gwyn Bellamy	You Qi	Excursion to	Kevin McGerty	Free Discussion
15:30-16:00	Tea Break	Tea Break	Yalong Bay Tropical Paradise Forest Park	Tea Break	Tea Break
16:00-17:00	Baohua Fu	Free Discussion		Tatsuyuki Hikita	Free Discussion
18:00-	Dinner	Conference Dinner	Dinner	Dinner	Dinner

Workshop on Algebraic Lie Theory and Symplectic Geometry

Tsinghua Sanya International Mathematics Forum (TSIMF)
Sanya, Hainan Province, China
March 21–25, 2016

Abstracts

Gwyn Bellamy (University of Glasgow)

Symplectic resolutions of quiver varieties

Quiver varieties, as introduced by Nakajima, play a key role in representation theory. They give a very large class of symplectic singularities and, in many cases, their symplectic resolutions too. However, there seems to be no general criterion in the literature for when a quiver variety admits a symplectic resolution. In this talk I will give necessary and sufficient conditions for a quiver variety to admit a symplectic resolution. This result is based on work of Crawley-Boevey and of Kaledin, Lehn and Sorger. The talk is based on joint work with T. Schedler.

Baohua Fu (Chinese Academy of Sciences)

Generic singularities of nilpotent orbit closures

According to a well-known theorem of Brieskorn and Slodowy, the intersection of the nilpotent cone of a simple Lie algebra with a transverse slice to the subregular nilpotent orbit is a simple surface singularity. At the opposite extremity of the nilpotent cone, the closure of the minimal nilpotent orbit is also an isolated symplectic singularity, called a minimal singularity. For classical Lie algebras, Kraft and Procesi have worked out all generic singularities of nilpotent orbit closures. I'll report a joint work with D. Juteau, P. Levy and E. Sommers, where we worked out the exceptional cases.

Tatsuyuki Hikita (Kyoto University)

On an algebro-geometric realization of the cohomology ring of conical symplectic resolutions

I'd like to explain a conjecture that the cohomology ring of conical symplectic resolution is isomorphic to the coordinate ring of some fixed point scheme of the affinization of the conical symplectic resolution which is symplectic dual to the original one. This generalizes a result of DeConcini–Procesi and Tanisaki that the cohomology ring of Springer fiber of type A is isomorphic to the coordinate ring of the scheme-theoretic intersection of some nilpotent orbit closure and Cartan subalgebra.

Kevin McGerty (University of Oxford)

Springer theory and symplectic resolutions

We will describe how an analogue of Springer's theory of Weyl group representations can be defined for a symplectic resolution of singularities, and explain what aspects

of the classical theory survive in this more general set-up. For finite type Nakajima quiver varieties we will show how one recovers the Weyl group action of Lusztig, Nakajima and Maffei.

Peter McNamara (University of Queensland)

The categorified braid group action and its consequences

It is well known that the braid group acts on a quantised enveloping algebra by algebra automorphisms. We discuss the categorification of this braid group action and some of its consequences. Applications include constructing reflection functors for quiver Hecke (KLR) algebras, and a theory of restricting a categorical representation along a face of a Weyl polytope.

Hiraku Nakajima (Kyoto University)

Cherkis bow varieties and Coulomb branches of quiver gauge theories of affine type A

I will report the on-going joint project with Yuuya Takayama. Cherkis bow varieties are cousins of quiver varieties, conjecturally describing moduli spaces of type A instantons on multi-Taub-NUT spaces. Our goal is to show that they are Coulomb branches of $3d$ $N = 4$ framed quiver gauge theories of affine type A . This result generalizes one for unframed cases, and is analogous to one for (un)framed ADE cases, proved with Braverman and Finkelberg.

Sian Nie (Chinese Academy of Sciences)

Connected components of affine Deligne–Lusztig varieties

Affine Deligne–Lusztig varieties are natural generalizations of classical Deligne–Lusztig varieties in the loop group setting. They are special fibers of certain Rapoport–Zink spaces and play an important role in the study of reductions of Shimura varieties. In the talk, I will discuss the description of the connected components of (closed) affine Deligne–Lusztig varieties, and some applications of this description.

You Qi (Yale University)

On the center of small quantum groups

We will report some recent progress on the problem of finding the center of small quantum groups. This will be based on joint work with Anna Lachowska.

Yu Qiu (Norwegian University of Science and Technology)

Twisted surfaces and spaces of signed quadratic differentials

We are interested in the space Quad of signed quadratic differentials on a marked surface S in the sense of Bridgeland–Smith. By introducing the twisted surface X of S , we calculate the fundamental group of Quad as a subgroup of the mapping class group of X . We conjecture that such a subgroup is isomorphic to the spherical twist group of the corresponding Calabi–Yau-3 category D , which will imply that the space of stability conditions on D is the universal cover of Quad. The conjecture holds in the case when S is unpunctured or a once-punctured disk. This is a joint work with Alastair King.

Raphaël Rouquier (University of California, Los Angeles)

Categories of higher representations

Higher representations of a complex semi-simple Lie algebras are expected to form a braided monoidal 2-category. I will explain how to construct part of that structure, and discuss relations with moduli spaces, knot invariants, and field theories.

Peng Shan (CNRS-Université Paris-Sud)

Categorification of coideal algebras

I'll report on a joint work with H. Bao, W. Wang, B. Webster on the categorification of a coideal subalgebra of the quantized enveloping algebra in type A using a 2-category analog to the one defined by Khovanov–Lauda–Rouquier.

Michela Varagnolo (Université de Cergy-Pontoise)

Categorical actions on unipotent representations of finite classical groups

I will report on a joint work with O. Dudas and E. Vasserot.

I will explain how to define (following the approach of Chuang and Rouquier for the general linear group) a categorical action of a Kac Moody algebra on the set of unipotent representations of a finite classical group in non-defining characteristic. The associated decategorified representation is a direct sum of level 2 Fock spaces. This has several corollaries, in particular the Harish-Chandra branching graph is the crystal graph of these Fock spaces.

Eric Vasserot (Université de Paris VII)

Kac polynomials and Yangian

To any quiver one associates a Yangian which may be defined either as a cohomological Hall algebra or via the Maulik-Okounkov classical r-matrix.

We'll report on the some recent progresses to compute the dimension of those Yangians.

Fan Xu (Tsinghua University)

A Ringel–Hall algebra and its quantum group

The aim of this talk is to clarify the relations between two definitions of comultiplications given by Lusztig and Green, respectively. More explicitly, we construct the geometric analog of Green's theorem on the comultiplication of a quantum group. It is an extension version of the Lusztig comultiplication.

Zhiwei Yun (Stanford University)

The block decomposition for perverse sheaves arising from cyclically graded Lie algebras

Let G be a simple and simply-connected algebraic group whose Lie algebra \mathfrak{g} carries a $\mathbb{Z}/m\mathbb{Z}$ -grading. The grading gives a subgroup G_0 with Lie algebra \mathfrak{g}_0 which acts on \mathfrak{g}_1 . Consider the derived category of G_0 -equivariant sheaves on \mathfrak{g}_1 that are supported on the nilpotent cone. In special cases, this category contains Fourier transforms of character sheaves and canonical bases arising from quivers.

For an arbitrary $\mathbb{Z}/m\mathbb{Z}$ -graded Lie algebra, we give a block decomposition of this category in terms of cuspidal data in the same spirit as the generalized Springer correspondence. In this setting we introduce a “spiral induction” which plays the same role as parabolic induction in the ungraded cases. This is joint work with G. Lusztig.