CONFERENCE

JOINT MEETING OF INSTITUTE OF MATHEMATICS-VAST AND SHENZHEN INTERNATIONAL CENTER FOR MATHEMATICS ON RECENT ADVANCES IN ALGEBRA

June 01 - 04, 2026

Hanoi, Vietnam

PROGRAM
&
ABSTRACTS

Institute of Mathematics

Vietnam Academy of Science and Technology

Sponsors

- Institute of Mathematics,Vietnam Academy of Science and Technology
- International Center of Research and Postgraduate Training in Mathematics
- Shenzhen International Center for Mathematics, China

Location

The workshop takes place at the Institute of Mathematics, in the buildings A5 on the campus of Vietnam Academy of Science and Technology, No. 18 Hoang Quoc Viet Road, Nghia Do Ward, Hanoi, Vietnam. Although the main entrance of the campus is No. 18 Hoang Quoc Viet Road.

Contact: Tran Giang Nam

E-mail: tgnam@math.ac.vn

Organizing Committee

- **Le Tuan Hoa** (Institute of Mathematics, VAST, Vietnam)
- **Vyacheslav Futorny** (Shenzhen International Center for Mathematics, China)
- **Tran Giang Nam** (Institute of Mathematics, VAST, Vietnam)

Scientific Committee

- **Doan Trung Cuong** (Institute of Mathematics, VAST, Vietnam)
- **Nguyen Quoc Thang** (Institute of Mathematics, VAST, Vietnam)
- **Efim Zelmanov** (Shenzhen International Center for Mathematics, China)
- **Jiping Zhang** (Shenzhen International Center for Mathematics, China)

PROGRAM

Monday, June 01, 2026

Morning

08:30 – 09:30 **Registration**
3rd floor, **Building A5**

09:30 – 10:00 **Opening Ceremony with Group photo**
Grand Hall, 3rd floor, **Building A5**

10:00 – 12h00 **Chair: Le Tuan Hoa**

10:00 – 10h45 *Infinite-dimensional nonassociative superalgebras*
Efim Zelmanov
Shenzhen International Center for Mathematics, China

10:45 – 11:15 **Coffee break**

11:15 – 12:00 *Factorizations of non-commutative free polynomials*
Pham Ngoc Anh
Alfréd Rényi Institute of Mathematics, Hungary

12:00 – 14:00 **Lunch**

Afternoon

14:00 – 16:00 **Chair: Vyacheslav Futorny**

Singular varieties and infinitesimal non-commutative Witt vectors
Phung Ho Hai
Institute of Mathematics, VAST, Vietnam

14:45 – 15:15 **Coffee break**

15:15 – 16:00 *On the cocharacter closedness and cocharacter closure of rational orbits for algebraic group actions over valued fields*
Dao Phuong Bac
VNU University of Science, Vietnam

Tuesday, June 02, 2026

Morning

09:00 – 11:45 **Chair: Changchang Xi**

09:00 – 09:45 *Depth functions of ideals*
Ngo Viet Trung
Institute of Mathematics, VAST, Vietnam

09:45 – 10:00 **Coffee break**

10:00 – 10:45 *Regularity of monomial ideals*
Nguyen Dang Hop
Institute of Mathematics, VAST, Vietnam

10:45 – 11:00 **Coffee break**

11:00 – 11:45 *Cyclomic factors of rational necklace polynomials*
Nguyen Duy Tan
Hanoi University of Science and Technology, Vietnam

11:45 – 14:00 **Lunch**

Afternoon

14:00 – 17:00 **Chair: Phung Ho Hai**

14:00 – 14:45 *Smooth representations of algebras*
Vyacheslav Futorny
Shenzhen International Center for Mathematics, China

14:45 – 15:15 **Coffee break**

15:15 – 16:00 *Quantum Symmetry: A New Lens for Noncommutative Invariants*
Nguyen Cat Van
United States Naval Academy, USA

16:00 – 16:15 **Coffee break**

16:15 – 17:00 **Cai Heng Li**
Shenzhen International Center for Mathematics, China

Wednesday, June 03, 2026

Morning

09:00 – 11:45 **Chair: Pham Ngoc Anh**

09:00 – 09:45 *On Alperin-Auslander/Auslander-Reiten conjecture*
Changchang Xi
Capital Normal University, Beijing, China

09:45 – 10:00 **Coffee break**

10:00 – 10:45 *Dynamics on graphs with finite Gelfand-Kirillov dimension*
Tran Giang Nam
Institute of Mathematics, VAST, Vietnam

10:45 – 11:00 **Coffee break**

11:00 – 11:45 *Local cohomology and certain module structures under flat extensions*
Le Thanh Nhan
Institute of Mathematics, VAST, Vietnam

11:45 – 14:00 **Lunch**

Afternoon

GROUP DISCUSSIONS

18:30 – 20:30 **Banquet**

Thursday, June 04, 2026

Morning

09:00 – 11:45	**Chair: Nguyen Quoc Thang**
09:00 – 09:45	*The Permutation Automorphism Groups of Irreducible Cyclic Codes* **Qing Xiang** Shenzhen International Center for Mathematics, China
09:45 – 10:00	**Coffee break**
10:00 – 10:45	*The least almost-prime in an arithmetic progression* **Ngo Trung Hieu** Institute of Mathematics, VAST, Vietnam
10:45 – 11:00	**Coffee break**
11:00 – 11:45	*Bergman algebras* **Roozbeh Hazrat** Western Sydney University, Australia
11:45 – 12:00	**Closing remarks**
12:00 – 14:00	**Lunch**

Afternoon

DEPARTURE

ABSTRACTS

Infinite-dimensional nonassociative superalgebras

Efim Zelmanov (Shenzhen International Center for Mathematics, China)

Abstract: We will discuss superconformal Lie and Jordan algebras, their generalizations and representations

Factorizations of non-commutative free polynomials

Pham Ngoc Anh (Alfréd Rényi Institute of Mathematics, Hungary)

Abstract: A non-commutative free polynomial, shortly a polynomial, is an element of a free algebra, or more generally, an element of the group of the free group of rank at least 2 over a field, avoiding the trivial case of polynomials in one variable. This is the first step in the factorization theory of polynomials over a commutative PID, say, the ring of integers. The case of free algebras, is a joint work with F. Mantese. For every polynomial f with invertible constant there is a finite-dimensional representation of the algebra such that factorizations of f correspond "bijectively" to composition chains of this representation. This extends the classical factorization theory of polynomials in one variable to free polynomials and offers also a way to find theoretically all factorizations of f. The tool to tackle this aim is the Fox algebra of free calculus, a variant of the Leavitt algebra.

Singular varieties and infinitesimal non-commutative Witt vectors

Phung Ho Hai (Institute of Mathematics, VAST, Vietnam)

Abstract: Given a projective variety X over an algebraically closed field k, M. V. Nori introduced a group scheme $\pi(X)$ which accounts for principal bundles $P \to X$

with finite structure, obtaining in this way an amplification of the étale fundamental group. One drawback of this theory is that it is quite difficult to arrive at an explicit description of $\pi(X)$, whenever it does not vanish altogether. To wit, there are no known non-trivial examples in the literature where $\pi(X)$ is local, or local of some given height, etc. In this paper we obtain a description of $\pi(X)$ through amalgamated products of certain non-commutative local group schemes – we called them infinitesimal non-commutative Witt group schemes – in the case where X is a non-normal variety obtained by pinching a simply connected one. (Joint work with J.P. dos Santos (Montpellier) and D.V. Thinh (IMVAST)).

On the cocharacter closedness and cocharacter closure of rational orbits for algebraic group actions over valued fields

Dao Phuong Bac (VNU University of Science, Vietnam)

Abstract: Let G be a linear algebraic group acting on an affine variety V, both defined over a field k. When k is algebraically closed, motivated by moduli problems in Algebraic Geometry, the Zariski closedness of the geometric orbit of a geometric point $v \in V$ has played a central role in Geometric Invariant Theory (GIT) since the pioneering work of D. Mumford in the 1960s. At the beginning of Geometric Invariant Theory (GIT), the treatment of cases where the base field is not algebraically closed was undertaken by D. Birkes (1971), G. Kempf, and independently by G. Rousseau (1978), ... In 2005, G. Roehrle and collaborators introduced a geometric framework for analyzing completely reducible subgroups proposed by J.-P. Serre, through the concept of cocharacter closedness of rational orbits $G(k).v$. Here we say that the rational orbit $G(k).v$ of a rational point v is cocharacter closed if this orbit contains the limit point (if exists) along any cocharacter of G. Now, assuming further that k is a valued field, we may endow $G(k)$ and $V(k)$ with the v-adic topology induced from the base field k. The aim of this talk is to discuss the relationship between the cocharacter closedness and Hausdorff closedness of rational orbits, as well as their respective closures in the cases that G is any torus or the conjugate action of general linear groups. This is a joint work with Vu Tuan Hien, Vo Duy Hoang, and Nguyen Minh Duc.

Depth functions of ideals

Ngo Viet Trung (Institute of Mathematics, VAST, Vietnam)

Abstract: Depth is an important cohomological invariant of a local ring or a graded algebra. A classical result of Brodmann states that the depth function of the rings modulo the powers of an ideal is asymptotically a constant function. Herzog and Hibi conjectured that this is the only restriction for the depth function of an ideal. This conjecture was settled by Ha-Nguyen-Trung-Trung. On the other hand, the depth function of the rings modulo the symbolic powers of an ideal behaves more wildly. Recently, Nguyen-Trung showed that this depth function can be any asymptotically periodic numerical function. This talk will give a brief survey on the motivation and ideas behind these results.

Regularity of monomial idealss

Nguyen Dang Hop (Institute of Mathematics, VAST, Vietnam)

Abstract: The (Castelnuovo–Mumford) regularity is a fundamental invariant of graded modules over standard graded k-algebras (where k is a field). We discuss some recent questions on the regularity of monomial ideals over polynomial rings. In particular, we discuss the regularity of chains of Inc-invariant ideals, namely chains of polynomial ideals that are invariant under monoid of strictly increasing functions on the natural numbers.

Cyclomic factors of rational necklace polynomials

Nguyen Duy Tan (Hanoi University of Science and Technology, Vietnam)

Abstract: In this talk, we discuss a new class of rational necklace functions that unifies two well-studied families of polynomials: necklace polynomials and Fekete polynomials. We describe several ways in which cyclotomic polynomials arise as factors of these rational necklace functions.

Smooth representations of algebras

Vyacheslav Futorny (Shenzhen International Center for Mathematics, China)

Abstract: We will discuss classification of simple smooth representations for different Z-graded algebras with a special focus on such representations for Affine Kac-Moody algebras.

Quantum Symmetry: A New Lens for Noncommutative Invariants

Nguyen Cat Van (United States Naval Academy, USA)

Abstract: We introduce the notion of quantum-symmetric equivalence for connected graded algebras, founded on the Morita-Takeuchi equivalence of their Manin universal quantum groups. We develop a deformation method that preserves the quantum-symmetric equivalence class of an algebra and investigate the ring-theoretic and homological properties that remain invariant under this relation. Finally, by integrating our framework with the work of Raedschelders and Van den Bergh, we demonstrate that all Koszul Artin-Schelter regular algebras of a fixed global dimension belong to a single quantum-symmetric equivalence class.

On Alperin-Auslander/Auslander-Reiten conjecture

Changchang Xi (Capital Normal University, Beijing, China)

Abstract: The long-standing AlperinAuslander/AuslanderReiten conjecture, in the representation theory of algebras and groups, states that the num-bers of non-isomorphic, non-projective simple modules of stably equivalent algebras should be equal. In this talk, we prove that the conjecture holds true for two classes of algebras: the centralizer matrix algebras and Frobenius-finite algebras. Moreover, we

show that some newly introduced homological data are invariants of stable equivalences of algebras. The talk present parts of a joint work with Jinbi Zhang in Math. Ann. 394(4)(2026), Article 99.

Dynamics on graphs with finite Gelfand-Kirillov dimension

Tran Giang Nam (Institute of Mathematics, VAST, Vietnam)

Abstract: A graph of Gelfand-Kirillov dimension is a connected finite essential graph whose Leavitt path algebra has finite Gelfand-Kirillov dimension. In this talk, we show that every graph of finite Gelfand-Kirillov dimension can be transformed into a normal-form graph via a finite sequence of in-splittings and out-splittings. Consequently, we provide number-theoretic criteria for determining when the edge shifts of meteor graphs of length three are isomorphic, and show that both Williams' Problem and Hazrat's Graded Morita Equivalence Conjecture hold for meteor graphs of length three. This is joint work with Pere Ara and Tran Quang Do.

Local cohomology and certain module structures under flat extensions

Le Thanh Nhan (Institute of Mathematics, VAST, Vietnam)

Abstract: In this talk, we present recent joint works with Pham Hung Quy, Tran Do Minh Chau and Nguyen Thi Hong Loan, [1], [2].

Let $R \to S$ be a flat local homomorphism between commutative Noetherian local rings $(R, \mathfrak{m})$ and $(S, \mathfrak{n})$. Let M be a finitely generated R-module. In this talk, firstly we establish shifted principles between the local cohomology R-module $H^i_{\mathfrak{m}}(M)$ and the local cohomology S-module $H^{i+r}_{\mathfrak{n}}(M \otimes_R S)$, where i is an integer and $\dim(S/\mathfrak{m}S) = r$. By using these shifted principles, we compute the annihilator, dimension and multiplicity of $H^{i+r}_{\mathfrak{n}}(M \otimes_R S)$ in terms of those of $H^i_{\mathfrak{m}}(M)$, and

describe the non-Cohen-Macaulay locus of $M \otimes_R S$ in terms of that of M. Secondly, we discuss the ascent and descent of certain module structures under flat extensions. Then we study the relationship between parameter ideals M and parameter ideals of $M \otimes_R S$.

References

[1] T. D. M. Chau, L. T. Nhan, Shifted principles for local cohomology modules under flat extensions, Preprint.

[2] N. T. H. Loan, L. T. Nhan, P. H. Quy, On Buchsbaum property and parameter ideals under under flat extensions, Preprint.

The Permutation Automorphism Groups of Irreducible Cyclic Codes

Qing Xiang (Shenzhen International Center for Mathematics, China)

Abstract: The study of permutation automorphism groups of cyclic codes is a central topic in algebraic coding theory. A cyclic code over Fq is called irreducible if its check polynomial is irreducible over Fq. Such a code is standard if its permutation automorphism group is equal to the group generated by the cyclic shift and the Frobenius automorphism, and non-standard otherwise. In this talk, we give a complete classification of all non-standard non-degenerate irreducible cyclic codes, using the classification of finite simple groups. Our result shows that, apart from a small number of explicit exceptional families and their descendants under certain secondary constructions, every non-degenerate irreducible cyclic code is standard, and up to four explicit exceptions, every degenerate cyclic code is non-standard.

The least almost-prime in an arithmetic progression

Ngo Trung Hieu (Institute of Mathematics, VAST, Vietnam)

Abstract: Given an integer sequence, a basic quest in number theory is to count numbers in this sequence with interesting multiplicative properties, such as primes and almost-primes. Towards this goal, sieve methods are designed to combinatorially extract simple divisibility properties of a sequence and combine with analytic tools for estimating sums and integrals to yield the desired arithmetic information. In this talk, I will introduce fundamental sieve methods to count primes and almost-primes. I will describe our recent progress in estimating the least almost-prime in an arithmetic progression. This is joint work with Ha Minh Dung and Hoang Duc Anh.

Bergman algebras

Roozbeh Hazrat (Western Sydney University, Australia)

Abstract: Exactly a half a century ago, George Bergman introduced a stunning machinery which would realise any commutative conical monoid as a non-stable K-theory of an algebra. The algebras constructed is minimal or universal. He showed many interesting algebras such as those of Leavitt can be constructed from his machinery. We will look at his paper. We then extend the results to the graded setting, where one can capture dynamics within algebras. This is a joint work with Huanhuan Li and Raimund Preusser.

LIST OF PARTICIPANTS

Ta Thi Hoai An
Institute of Mathematics, VAST
tthan@math.ac.vn

Tran Nguyen An
University Education Thai Nguyen University

Tran Thi Hoang Anh
Institute of Mathematics, VAST

Pham Ngoc Anh
Alfréd Rényi Institute of Mathematics, Hungary
anh.pham.ngoc@renyi.hu

Dao Phuong Bac
VNU University of Science
dpbac.vnu@gmail.com

Chengming Bai
Chern Institute of Mathematics, Nankai University, China

Vo Quoc Bao
Institute of Mathematics, VAST
vqbao@math.ac.vn

Tran Do Minh Chau
University Education Thai Nguyen University
chautdm@tnue.edu.vn

Doan Trung Cuong
Institute of Mathematics, VAST
dtcuong@math.ac.vn

Remarl Joseph Damalerio
Mindanao State University, Philippines
remarl

Le Van Dinh
FPT University

Romar Dinoy
Bohol Island State University, Philippines
romar.dinoy@bisu.edu.ph

Tran Quang Do
Institute of Mathematics, VAST
tqdo@math.ac.vn

Vyacheslav Futorny
Shenzhen International Center for Mathematics, China
futorny@sustech.edu.cn

Stavros Garoufalidis
Shenzhen International Center for Mathematics, China
stavros@mpim-bonn.mpg.de

Phung Ho Hai
Institute of Mathematics, VAST
phung@math.ac.vn

Nguyen Thi Anh Hang
University Education Thai Nguyen University

Nguyen Thu Hang
University Sciences Thai Nguyen University
nguyenthuhang0508@gmail.com

Roozbeh Hazrat
Western Sydney University, Australia
R.Hazrat@westernsydney.edu.au

Truong Thi Hien
University Hong Duc, Thanh Hoa
hientruong86@gmail.com

Ha Thu Hien
Foreign Trade University
thuhienha504@gmail.com

Ngo Trung Hieu
Institute of Mathematics, VAST
nthieu@math.ac.vn

Le Tuan Hoa
Institute of Mathematics, VAST
lthoa@math.ac.vn

Do Trong Hoang
Hanoi University Sciences and Techology
dotronghoang@gmail.com

Nguyen Dang Hop
Institute of Mathematics, VAST
ndhop@math.ac.vn

Duong Thi Huong
Thang Long University
duonghuongtlu@gmail.com

Iryna Kasuba
Shenzhen International Center for Mathematics, China

Do Van Kien
Hanoi University Education No. 2
dovankien@hpu2.edu.vn

Ha Minh Lam
Institute of Mathematics, VAST
hmlam@math.ac.vn

Cai Heng Li
Shenzhen International Center for Mathematics, China

Nguyen Xuan Linh
Hanoi University of Civil Engineering

Nguyen Quang Loc
Hanoi University Education

Dong Huu Mau
Hanoi Metropolitan University
dhmau@daihocthudo.edu.vn

Aslam Naila
Comsats University Islambad, Pakistan

Pham Hong Nam
University Sciences Thai Nguyen University
phamhongnam2106@gmail.com

Nguyen Dinh Nam
Ha Tinh University
nam.nguyendinh@htu.edu.vn

Tran Giang Nam
Institute of Mathematics, VAST
tgnam@math.ac.vn

Nguyen Van Ninh
University Education Thai Nguyen University
nguyenvanninh@dhsptn.edu.vn

Le Thanh Nhan
Institute of Mathematics, VAST
lttnhan@math.ac.vn

Pham Hung Quy
FPT University
phamhungquy@gmail.com

Nguyen Thanh Tam
Hung Vuong University
thanhtamnguyenhv@gmail.com

Pham Thanh Tam
Hanoi University Education No. 2
phamthanhtam@hpu2.edu.vn

Tran Dai Tan
Institute of Mathematics, VAST

Nguyen Duy Tan
Hanoi University of Science and Technology, Vietnam
tan.nguyenduy@hust.edu.vn

Nguyen Quoc Thang
Institute of Mathematics, VAST
nqthang@math.ac.vn

Tran Van Thanh
Institute of Mathematics, VAST

Phan Thi Thuy
Hanoi National University Education
phanthuy@hnue.edu.vn

Dao Van Thinh
Institute of Mathematics, VAST
dvthinh@math.ac.vn

Doan Quang Tien
Institute of Mathematics, VAST

Nguyen Thi Tra
Hanoi University Education No. 2
nguyentra.bsu@gmail.com

Tran Nam Trung
VNU University of Engineering and Technology

Ngo Viet Trung
Institute of Mathematics, VAST
nvtrung@math.ac.vn

Hoang Manh Truong
FPT University

Nguyen Cat Van
United States Naval Academy, USA
van.nguyen3@gmail.com

Nguyen Chu Gia Vuong
Institute of Mathematics, VAST
ncgvuong@math.ac.vn

Changchang Xi
Capital Normal University, Beijing, China
xicc@cnu.edu.cn

Qing Xiang
Shenzhen International Center for Mathematics, China
xiangq@sustech.edu.cn

Jiping Zhang
Shenzhen International Center for Mathematics, China
jzhang@pku.edu.cn

Efim Zelmanov
Shenzhen International Center for Mathematics, China
efim.zelmanov@gmail.com