



# 2024 International workshop on algebra at TUS-Noda

Organizers: Hiroki Aoki (Tokyo University of Science)  
Tomokazu Kashio (Tokyo University of Science)  
Hisanori Ohashi (Tokyo University of Science)

Date: January 20th (Sat.) 2024

Venue: MA Seminar room, Faculty of Science and Technology,  
Tokyo University of Science, Noda, Chiba, JAPAN.

## Jan. 20 (Sat.) 10:30 – 11:00

金子 千奈 (東京理科大学) **China Kaneko** (Tokyo University of Science)

### “The octanomial normal form of cubic surfaces”

A cubic surface in  $P^3$  has been well studied since Cayley and Salmon discovered the 27 lines on it in 1849. A new normalized equation of cubic surfaces, called the octanomial normal form, was discovered by Panizzut, Sertöz, and Sturmfels in 2019. They proved that every cubic surface is projectively isomorphic to the one defined by the octanomial form in characteristic 0 in a computational way. I showed this fact in any characteristic in a more conceptual way. In this talk, I will give an outline of the theorem and applications to the study of the moduli space of cubic surfaces.

## Jan. 20 (Sat.) 11:00 – 11:30

比嘉 陸 (東京理科大学) **Riku Higa** (Tokyo University of Science)

### “Constructions of $A_n, D_n$ -Lattices from self-dual basis and coding theory”

Let  $F/\mathbb{Q}$  be a Galois extension of odd degree, then  $F$  has a self-dual normal basis over  $\mathbb{Q}$ . We construct  $A_n, D_n$ -lattices that can be embedded in  $F$  from the basis. Furthermore, we report a method for constructing even unimodular lattices from these lattices and the correspondence with codes.

## Jan. 20 (Sat.) 11:30 – 12:00

安藤 遼哉 (東京理科大学) **Ryoya Ando** (Tokyo University of Science)

### “Some topics on non Noetherian commutative rings”

Homological methods are well studied in commutative ring theory. These methods have been used to study the properties of ideals in rings whose ideals are not necessarily finitely generated. In this talk, we introduce the generalization of the theorems of Noetherian rings by homological methods and topics of classes of some rings.

**Jan. 20 (Sat.) 13:30 – 14:00**

吉崎 彪雅 (東京理科大学) **Hyuga Yoshizaki** (Tokyo University of Science)

**“Integer continued fractions”**

It is well known that each irrational number has unique regular continued fraction expansion, that is, continued fraction over the positive integers. It is also known that the regular continued fractions have important roles in the theory of quadratic number fields and Diophantine approximation. In this talk, we deal with “Integer” continued fractions and observe how they differ from the regular continued fractions.

**Jan. 20 (Sat.) 14:00 – 14:30**

関川 隆太郎 (東京理科大学) **Ryutaro Sekigawa** (Tokyo University of Science)

**“On the monogeneity of cyclic extensions”**

Let  $K/k$  be an extension of number fields and  $\mathcal{O}_K, \mathcal{O}_k$  be the rings of integers of  $K, k$ , respectively. It is said that  $K/k$  is monogenic if  $\mathcal{O}_K = \mathcal{O}_k[\alpha]$ . In this talk, we provide an equivalent condition for any cyclic cubic field, and a sufficient condition for a cyclic extension of odd prime degree  $l$  over  $\mathbb{Q}(\zeta_l + \zeta_l^{-1})$ . This talk is partly based on joint work with Tomokazu Kashio.

**Jan. 20 (Sat.) 15:00 – 16:00**

周 海港 (同済大学) **Haigang Zhou** (Tongji University)

**“From sums of squares to modular forms”**

The problem of sums of squares is a classic problem in number theory, and many famous mathematicians have made significant contributions in this field, such as Fermat, Euler, Gauss, Legendre, Lagrange, and others. More generally, quadratic form theory holds a crucial position in the modern development of mathematics, fostering the progress of algebra and number theory. In this talk, we will briefly review the historical development of the sums of squares problem and introduce its relationship with modular forms.

**Jan. 20 (Sat.) 16:00 – 17:00**

**Siegfried Böcherer** (マンハイム大学) **Siegfried Böcherer** (University of Mannheim)

**“Intrinsic Arithmetic of Siegel Modular Forms”**

The vector space of holomorphic Siegel modular forms has a basis with integral Fourier coefficients. This is a crucial property allowing many links to number theory. We will discuss proofs which only use (intrinsic !) methods from the theory of modular forms, in particular, Eisenstein series. We also discuss generalizations to vector-valued modular forms.

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・参加申込不要、どなたでもご自由に聴講いただけます。

(会場) 東京理科大学 野田キャンパス 4号館 3階 数理科学科セミナー室  
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本研究集会は、東京理科大学総合研究院先端的代数学融合研究部門の行事として開催されます。

本研究集会は、上記部門のほか、JSPS 科研費 JP23K03039 の助成を受けています。