Workshop on Affine Algebraic Geometry and Related Topics

Date: 17th November – 22nd November, 2026

Venue:
Kolmogorov Bhawan, Stat-Math Unit
Indian Statistical Institute
203, B.T. Road, Kolkata 700108

Organizers:
Neena Gupta (Indian Statistical Institute, Kolkata, India)
Takanori Nagamine (Nihon University, Tokyo, Japan)

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Web page: https://sites.google.com/view/workshop-affine-algebraic-geom/

TIME TABLE

Time	Nov 17 (TUE)	Nov 18 (WED)	Nov 19 (THU)	Nov 20 (FRI)	Nov 21 (SAT)
10:00–10:50	Free	S.M. Bhatwadekar	M. Miyanishi	R.V. Gurjar	N. Onoda
11:00–11:30	Free	N. Dasgupta	P.M.S. Sai Krishna	B. Hajra	S. Singha
11:30–12:00	Tea Time				
12:00–12:30	Inauguration	M. Keshari	H. Kojima	T. Kishimoto	M. Sawahara
12:40–13:10	T. Nagamine	A. Pal	D. Saha	D. Mondal	S. Sen
13:10–14:30	Lunch				
14:30–15:00	M. Pal	K. Masuda	S. Kuroda	Free	Free
15:10–15:40	S. Chakraborty	A. Lahiri	M.K. Das	Free	Free
15:40–16:10	Tea Time				
16:10–16:40	Tanvi	R. Kudo	K. Chakraborty	Free	Free
16:50–17:20	P. Das	R. Tanimoto	S. Banerjee	Free	Free

PROGRAM

17th November (Tuesday)

- 12:00–12:30 Inauguration
- 12:40–13:10
  Takanori Nagamine (Nihon University)
  Quasi-factoriality of monoid algebras in Laurent polynomial rings
- 14:30–15:00
  Madhuparna Pal (Ramakrishna Mission Vivekananda Educational and Research Institute)
  Binomial Retracts of polynomial rings
- 15:10–15:40
  Sagnik Chakraborty (Ramakrishna Mission Vivekananda Educational and Research Institute)
  Around Hamann's example of a retract of $R[X, Y]$ that is not a symmetric algebra over R
- 16:10–16:40
  Tanvi (Indian Institute of Space Science and Technology)
  On a Question by Kojima-Nagamine
- 16:50–17:20
  Prosenjit Das (Indian Institute of Space Science and Technology)
  On closed and composite polynomials

18th November (Wednesday)

- 10:00–10:50
  S.M. Bhatwadekar (Bhaskaracharya Pratishthana)
  Structure of the kernel of a locally nilpotent derivation on an affine normal domain
- 11:00–11:30
  Nikhilesh Dasgupta (GITAM University)
  On commuting locally nilpotent derivations in $k[X, Y, Z]$
- 12:00–12:30
  Manoj Keshari (Indian Institute of Technology, Mumbai)
  Positive polynomials and sum of squares
- 12:40–13:10
  Ananya Pal (HSE University)
  On the Regular Borel subalgebras of the Lie algebra of $\mathrm{Aut}(\mathbb{A}^2)$
- 14:30–15:00
  Kayo Masuda (Kwansei Gakuin University)
  Smooth acyclic affine G-variety for $G = G_a \rtimes T$
- 15:10–15:40
  Animesh Lahiri (GITAM University)
  On image ideals of nice and quasi-nice derivations on $R[X_1, X_2]$
- 16:10–16:40
  Riku Kudo (Waseda University)
  On extensions of the Winkelmann derivation and principal $\mathbb{G}_a$-bundles
- 16:50–17:20
  Ryuji Tanimoto (Shizuoka University)
  Exponential matrices, $\mathbb{G}_a$-actions on projective spaces and modular representations of elementary abelian p-groups

19th November (Thursday)

- 10:00–10:50
  Masayoshi Miyanishi (Kwansei Gakuin University)
  Weak del Pezzo pairs and a conjecture proposed for characterizing the algebraic spaces
- 11:00–11:30
  P.M.S. Sai Krishna (Indian Statistical Institute, Kolkata)
  A new proof of Miyanishi's result $\mathbb{A}^3//\mathbb{G}_a \cong \mathbb{A}^2$
- 12:00–12:30
  Hideo Kojima (Niigata University)
  Curves on irrational ruled surfaces whose complements are of non-general type
- 12:40–13:10
  Debojyoti Saha (Indian Statistical Institute, Kolkata)
  On triviality of $\mathbb{A}^2$-forms admitting a nontrivial $\mathbb{G}_a$-action
- 14:30–15:00
  Shigeru Kuroda (Tokyo Metropolitan University)
  Nagata's conjecture on a polynomial automorphism over a field of positive characteristic
- 15:10–15:40
  Mrinal Kanti Das (Indian Statistical Institute, Kolkata)
  Euler cycles and Mennicke symbols over affine algebras
- 16:10–16:40
  Kuntal Chakraborty (Indian Statistical Institute, Kolkata)
  Improved Injective Stability for Relative Linear and Symplectic K_1-Groups
- 16:50–17:20
  Sourjya Banerjee (Indian Institute of Technology, Hyderabad)
  Unimodular rows over real affine algebras
- Photo/Banquet

20th November (Friday)

- 10:00–10:50
  R.V. Gurjar (Indian Institute of Technology, Mumbai)
  Line bundles on affine varieties
- 11:00–11:30
  Buddhadev Hajra (Indian Statistical Institute, Kolkata)
  Smooth complex affine surfaces properly dominated by the two-dimensional complex algebraic torus
- 12:00–12:30
  Takashi Kishimoto (Saitama University)
  Rationality and Cylindricity of weighted Fano threefold hypersurfaces
- 12:40–13:10
  Dibyendu Mondal (Indian Institute of Technology, Indore)
  Isotropy Groups of Some Polynomial Derivations
- 14:30–17:20 Free discussion

21st November (Saturday)

- 10:00–10:50
  Nobuharu Onoda (University of Fukui)
  On isomorphism classes of Specker algebras
- 11:00–11:30
  Sanjay Singha (Indian Statistical Institute, Kolkata)
  Finite Generation of Locally Nilpotent Derivations of $R[X, Y, Z]$
- 12:00–12:30
  Masatomo Sawahara (Hirosaki University)
  Polarized cylinders in singular del Pezzo surfaces
- 12:40–13:10
  Sourav Sen (SRM University-AP)
  Automorphism groups and non-equivalent embeddings of certain class affine algebraic varieties
- Closing
- 14:30–17:20 Free discussion

22nd November (Sunday)

- 10:00–17:20 Free discussion

ABSTRACT

17th November (Tuesday)

Takanori Nagamine (Nihon University)

Title: Quasi-factoriality of monoid algebras in Laurent polynomial rings

Let R be a domain and B the Laurent polynomial ring over R. In this talk, we study quasi-factorially closed (qfc) R-subalgebras of B, which generalize the notion of factorially closed (fc) subalgebras. Recall that an R-subalgebra $A \subset B$ is fc in B if for $a, b \in B \setminus \{0\}$, the condition $ab \in A$ implies $a, b \in A$. By definition, if $A^* \subsetneq B^*$, then A cannot be fc in B. With this observation, it is natural to generalize the notion of fc. Indeed, the following concept has been introduced in the literature: A is qfc in B if for $a, b \in B \setminus \{0\}$, the condition $ab \in A$ implies $ua, vb \in A$ for some $u, v \in B^*$.

In this talk, we investigate monoid algebras $A = R[M]$ associated with submonoids $M \subset \mathbb{Z}^n$. We prove that $R[M]$ is qfc in B if and only if the group generated by M is a direct summand of $\mathbb{Z}^n$. As a consequence, when $n = 1$ and $M \subset \mathbb{N}$, the algebra $R[M]$ is qfc in B precisely when M is a numerical semigroup. Moreover, we clarify how the qfc condition is related to normality. This is joint work with Shinya Kumashiro (Osaka Institute of Technology).

Madhuparna Pal (Ramakrishna Mission Vivekananda Educational and Research Institute)

Title: Binomial Retracts of polynomial rings

Let R be a domain and $B \cong R[X_1, \ldots, X_n]$ be the polynomial ring in n variables over R. Let $\varphi : B \to B$ be an R-retraction such that $\varphi(X_i)$ is 0, or a monomial or the sum of two monomials. The aim of this talk is to show that, under certain conditions on the base ring R, the resulting retract is also a polynomial ring over R.

Sagnik Chakraborty (Ramakrishna Mission Vivekananda Educational and Research Institute)

Title: Around Hamann's example of a retract of $R[X, Y]$ that is not a symmetric algebra over R

In 1975, E. Hamann gave an example of a retract of $R[X, Y]$ that is not isomorphic to a symmetric algebra of an invertible ideal of R, where R is a one-dimensional Noetherian local domain of positive characteristic which is not semi-normal. In this example, the images of the variables X, Y contain three and four terms, respectively. On the other hand, C. Greither proved in 1981 that if R is a Noetherian semi-normal domain, then every non-trivial retract of $R[X, Y]$ is isomorphic to a symmetric algebra of an invertible ideal of R. The speaker, in a joint work with Madhuparna Pal, recently proved that if the images of the variables of a non-trivial retraction of $R[X, Y]$ contain at most two terms, then the retract is isomorphic to a symmetric algebra of an invertible ideal of R. Therefore, it is worth exploring the upper bound on the number of terms in the images of the variables of a non-trivial retraction of $R[X, Y]$ that would ensure that the resulting retract is isomorphic to a symmetric algebra of an invertible ideal of R. In this connection, we will show that one cannot improve Hamann's example; if the images of the variables of a non-trivial retraction of $R[X, Y]$ contain at most three terms, or if the image of one of the variables contain at most two terms, then the resulting retract of $R[X, Y]$ is isomorphic to a symmetric algebra of an invertible ideal of R.

Tanvi (Indian Institute of Space Science and Technology)

Title: On a Question by Kojima-Nagamine

Let R denote an integral domain and A a polynomial algebra over R. A non-constant polynomial $f \in A$ is called a closed polynomial if $R[f]$ is integrally closed in A.

A question posed by Kojima and Nagamine asks whether there exists an integral domain R of characteristic zero and a non-constant polynomial $f \in A$ such that $\mathrm{Qt}(R)[f] \cap A = R[f]$, $R[f]$ is maximal in the family $\{R[g] \mid g \in A \setminus R\}$, and f is not closed in A. In this talk, we discuss around this problem.

Prosenjit Das (Indian Institute of Space Science and Technology)

Title: On closed and composite polynomials

In this talk, we first survey problems and existing results on closed and composite polynomials, then discuss some of our recent observations.

18th November (Wednesday)

S.M. Bhatwadekar (Bhaskaracharya Pratishthana)

Title: Structure of the kernel of a locally nilpotent derivation on an affine normal domain

Let k denote an algebraically closed field of characteristic zero and let B be an affine normal k-domain. Let δ be a locally nilpotent derivation on B and let A be the kernel of δ. It is known that A need not be affine over k. In this paper we show that even if A is not affine, A is almost affine in the sense that there is an affine normal k-domain C and two nonzero elements x, y in C such that $A = C[1/x] \cap C[1/y]$.

Nikhilesh Dasgupta (GITAM University)

Title: On commuting locally nilpotent derivations in $k[X, Y, Z]$

Locally nilpotent derivations (LNDs) are a fundamental tool for studying the automorphism group and additive group actions on affine algebraic varieties. Despite their central role, a full classification of locally nilpotent derivations of the polynomial algebra $k[X, Y, Z]$ over a field k of characteristic zero remains open.

In this talk, I will present a new iterative construction that produces *all* locally nilpotent derivations of rank 2, and show how this construction naturally yields examples that are non-triangularizable locally nilpotent derivations of $k[X, Y, Z]$. I will then turn to the case of rank 3 derivations, where I will show that the well-known example due to Freudenburg is a member of a large new family of rank 3 locally nilpotent derivations. The key idea underlying both results is to study a given locally nilpotent derivation through the *all* locally nilpotent derivations that commute with it.

This is based on a joint work with S. Gaifullin.

Manoj Keshari (Indian Institute of Technology, Mumbai)

Title: Positive polynomials and sum of squares

1. Let K be a finite union of closed intervals in $\mathbb{R}$ with $\partial K \subset \mathbb{Q}$. Then there exist $g_1, \ldots, g_s \in \mathbb{Q}[x]$ such that $K = \{x \in \mathbb{R} : g_i(x) \geq 0 \text{ for } i = 1, \ldots, s\}$. Let $f \in \mathbb{Q}[x]$. Then Keshari, Ojha and Patra proved that $f \geq 0$ on K if and only if there exist $f_{e,j} \in \mathbb{Q}[x]$ such that f has a representation

$$f = \sum_{e=(e_1,\ldots,e_s)\in\{0,1\}^s} \left(\sum_{j=1}^{n_e} f_{e,j}^2 \right) g_1^{e_1} \cdots g_n^{e_n}.$$

2. Let $K_1 = [0, 1] \times \mathbb{R}$ and $f(x, y) \in \mathbb{R}[x, y]$. Then Marshall proved that $f \geq 0$ on K_1 if and only if there exist $f_i, f_j' \in \mathbb{R}[x, y]$ such that f has a representation

$$f = \left(\sum_1^n f_i^2 \right) + \left(\sum_1^m f_j'^2 \right) (x - x^2).$$

3. Question : If $f(x, y) \in \mathbb{Q}[x, y]$ and $f \geq 0$ on K_1, then does there exist $f_i, f_j' \in \mathbb{Q}[x, y]$ such that f has a representation as in (2). We will discuss a partial result.

Ananya Pal (HSE University)

Title: On the Regular Borel subalgebras of the Lie algebra of Aut($\mathbb{A}^2$)

Automorphism group of affine spaces, starting from affine plane, are interesting objects of study in Algebraic Geometry. But till now very little is known and understood of them. They are the first examples of ind-groups, so behavior of their Lie algebras are very different from the behavior of the Lie algebra of an algebraic group. In particular, there is no one to one correspondence between the Borel subgroups of $\mathrm{Aut}(\mathbb{A}^n)$, $n \geqslant 2$ and the Borel subalgebras of $\mathrm{Lie}(\mathrm{Aut}(\mathbb{A}^n))$.

In this talk we consider the regular Borel subalgebras of $\mathrm{Lie}(\mathrm{Aut}(\mathbb{A}^2))$, i.e., maximal solvable subalgebras generated by homogeneous derivations with respect to the standard $\mathbb{Z}^2$-grading and give an combinatorial description of them. We will also discuss their isomorphism classes.

In particular, we show that regular Borel subalgebras of $\mathrm{Lie}(\mathrm{Aut}(\mathbb{A}^2))$ have derived length 2 or 3 and most of them do not correspond to any Borel subgroup of $\mathrm{Aut}(\mathbb{A}^2)$.

Kayo Masuda (Kwansei Gakuin University)

Title: Smooth acyclic affine G-variety for $G = G_a \rtimes T$

Let B be a $\mathbb{Z}^r$-graded affine $\mathbb{C}$-domain of dimension $n \geq 3$ with a homogeneous locally nilpotent derivation δ. Then $X = \mathrm{Spec}B$ is an affine variety with an algebraic action of $G_a \rtimes T$ where T is an r-dimensional algebraic torus. Let f be a homogeneous element of $A = \mathrm{Ker}\,\delta$. When X and the fiber $f^{-1}(0)$ of the morphism $f : X \to \mathbb{A}^1$ are smooth and acyclic, we investigate general fiber of f under some conditions.

Animesh Lahiri (GITAM University)

Title: On image ideals of nice and quasi-nice derivations on $R[X_1, X_2]$

We study the structure of image ideals of irreducible nice and quasi-nice R-derivations on $R[X_1, X_2]$, where R is a finitely generated UFD over a field of characteristic zero. For nice derivations D (i.e., $D^2X_1 = D^2X_2 = 0$), the j-th image ideal is $(DX_1, DX_2)^j \ker(D)$ for all $j \geqslant 1$. For strictly 1-quasi-nice derivations (i.e., $D^2X_1 = 0$) with DX_1 irreducible, we describe the image ideals via weighted degrees and divisibility data of the coefficients of DX_2; in particular, if DX_1 and the leading coefficient of DX_2 are comaximal, the j-th image ideal is generated by $(DX_1)^j$. When R is a PID, we give explicit generators in terms of the prime factors of DX_1. These results provide a unified, computable framework for understanding image ideals of such derivations.

Riku Kudo (Waseda University)

Title: On extensions of the Winkelmann derivation and principal $\mathbb{G}_a$-bundles

The Winkelmann Derivation is a derivation defined on a polynomial ring in five variables over a field k. Principal $\mathbb{G}_a$-bundles over the geometric quotient W of the corresponding $\mathbb{G}_a$-action on the 5-dimensional affine space are expected to be candidates for counterexamples to the Zariski cancellation problem. In this talk, I will explain the relationship between principal $\mathbb{G}_a$-bundles over W and extensions of the Winkelmann derivation, and provide sufficient conditions for a principal $\mathbb{G}_a$-bundle over W to be isomorphic to the affine space.

Ryuji Tanimoto (Shizuoka University)

Title: Exponential matrices, $\mathbb{G}_a$-actions on projective spaces and modular representations of elementary abelian p-groups

We are concerned with collaborative developments of exponential matrices, $\mathbb{G}_a$-actions on projective spaces and modular representations of elementary abelian p-groups. We give a one-to-one correspondence between the set of all exponential matrices and the set of all $\mathbb{G}_a$-actions on projective spaces. And in positive characteristic p, we show that there exists a trivial $\mathbb{Z}_{\geq 0}$-fibration from the set of all modular representations of elementary abelian p-groups to the set of all exponential matrices.

19th November (Thursday)

Masayoshi Miyanishi (Kwansei Gakuin University)

Title: Weak del Pezzo pairs and a conjecture proposed for characterizing the algebraic spaces

A weak del Pezzo pair consists of a smooth projective variety V and an SNC-divisor D on V such that $-(D + K_V)$ is nef and big. We present a classification of such pairs if $\dim V = 2$. Inspired by this study, we propose the following conjecture, which I call Affine Hartshorne Conjecture. Let V be a smooth projective variety and let D be an SNC-divisor on V. Suppose that the log tangent bundle $T_V(\log D)$ is a nef vector bundle. Then $V \setminus D$ is isomorphic to the affine space. Namely $V \setminus D \cong \mathbb{A}^n$. The conjecture holds true if $\dim V = n \leq 2$ or D is an irreducible ample divisor. We discuss the outlines of related results.

P.M.S. Sai Krishna (Indian Statistical Institute, Kolkata)

Title: A new proof of Miyanishi's result $\mathbb{A}^3//\mathbb{G}_a \cong \mathbb{A}^2$

We give a different proof of M. Miyanishi's result $\mathbb{A}^3//\mathbb{G}_a$ is isomorphic to $\mathbb{A}^2$. Our proof works when the ground field is algebraically closed of either characteristic 0, or > 5. We assume the quotient morphism is surjective when the characteristic is > 5. This is a joint work with R.V. Gurjar.

Hideo Kojima (Niigata University)

Title: Curves on irrational ruled surfaces whose complements are of non-general type

Let B be a curve on an irrational ruled surface X. First, we give a rough configuration of B when the logarithmic Kodaira dimension of $X - B$ is less than two and show that the logarithmic Kodaira dimension of $X - B$ equals the Iitaka dimension of $K_X + B$. Next, we study the logarithmic multi-canonical system of $X - B$ when the logarithmic Kodaira dimension of $X - B$ equals one and prove that its logarithmic m-canonical system gives either a $\mathbb{P}^1$-fibration or an elliptic fibration if $m \geq 12$.

Debojyoti Saha (Indian Statistical Institute, Kolkata)

Title: On triviality of $\mathbb{A}^2$-forms admitting a nontrivial $\mathbb{G}_a$-action

In this paper, we give a structure theorem for $\mathbb{A}^2$-forms over arbitrary field extensions admitting a nontrivial $\mathbb{G}_a$-action. As a consequence of the structure theorem, we prove that any $\mathbb{A}^2$-form is cancellative, a generalization of the Zariski Cancellation Theorem for the affine plane over an arbitrary field. From the structure theorem we also derive some conditions under which an $\mathbb{A}^2$-form becomes trivial. In particular, we prove that over a field k, a factorial $\mathbb{A}^2$-form having a k-rational point and a non-trivial $\mathbb{G}_a$-action is trivial and we also give examples demonstrating that none of these hypotheses can be discarded.

Shigeru Kuroda (Tokyo Metropolitan University)

Title: Nagata's conjecture on a polynomial automorphism over a field of positive characteristic

An automorphism of the polynomial ring $k[x_1, \ldots, x_n]$ in n variables over a field k is said to be *tame* if it is obtained by composing affine automorphisms and elementary automorphisms, and *wild* otherwise. In 1942, Jung proved that every automorphism of $k[x_1, x_2]$ is tame for $\operatorname{char} k = 0$, which was later extended to the case $\operatorname{char} k \geq 0$ by van der Kulk. In 1972, Nagata conjectured that there exists a wild automorphism of $k[x_1, x_2, x_3]$, and presented the following as a potential wild automorphism of $k[x_1, x_2, x_3]$:

$$\begin{aligned} x_1 &\mapsto x_1 - 2(x_1x_3 + x_2^2)x_2 - (x_1x_3 + x_2^2)^2x_3 \\ x_2 &\mapsto x_2 + (x_1x_3 + x_2^2)x_3 \\ x_3 &\mapsto x_3. \end{aligned}$$

In 2003, Shestakov-Umirbaev settled this conjecture in the affirmative for $\operatorname{char} k = 0$. Recently, I proved Nagata's conjecture for $\operatorname{char} k \geq 7$. This is the first time that the existence of a wild automorphism has been confirmed in the positive characteristic case. In this talk, we discuss the key inequality essential for the proof.

Mrinal Kanti Das (Indian Statistical Institute, Kolkata)

Title: Euler cycles and Mennicke symbols over affine algebras

Let R be an affine algebra of dimension $d \geq 2$ over an infinite perfect field k. We compare the d-th Euler class group $E^d(R)$ with the van der Kallen group of elementary orbits of unimodular rows of length $d + 1$. This is done via two morphisms of opposite directions. The exposition is based on an unpublished joint work of Bhatwadekar-Das-Tikader-Zinna.

Kuntal Chakraborty (Indian Statistical Institute, Kolkata)

Title: Improved Injective Stability for Relative Linear and Symplectic K_1-Groups

In this talk, we discuss improved injective stability bounds for relative linear and symplectic K_1-groups of smooth affine algebras with respect to a smooth ideal I, that is, an ideal for which R/I is regular. The key ingredients are a relative version of Vorst's theorem and a relative Karoubi periodicity sequence for the elementary symplectic Witt group. As an application, we obtain a necessary and sufficient criterion for the freeness of stably free modules over smooth real 4-folds with empty real locus. This is a joint work with Dr. S. Banerjee.

Sourjya Banerjee (Indian Institute of Technology, Hyderabad)

Title: Unimodular rows over real affine algebras

Let A be an affine algebra over a field. A unimodular row of length n over A is an n-tuple whose entries generate the algebra A. The group of all invertible n by n matrices over A acts on the set of all unimodular rows of length n by multiplication. In this talk, we will try to understand the orbit space when the length n is strictly smaller than the dimension of the affine algebra A. This talk is based on joint work with Jean Fasel and Samuel Lerbet.

20th November (Friday)

R.V. Gurjar (Indian Institute of Technology, Mumbai)

Title: Line bundles on affine varieties

We will discuss finite unramified coverings of normal affine varieties V corresponding to torsion line bundles on V and units in the coordinate ring of V. We will prove relations between the group of torsion line bundles, and group of units to first homology of V. We will also give examples of their interplay. An interesting criterion of triviality of a line bundle on V will be discussed.

This is a joint work with Sudarshan Gurjar.

Buddhadev Hajra (Indian Statistical Institute, Kolkata)

Title: Smooth complex affine surfaces properly dominated by the two-dimensional complex algebraic torus

In this talk, I will present a classification of smooth complex affine surfaces admitting a finite surjective morphism from the two-dimensional complex algebraic torus, which is the product of two punctured complex affine lines. This confirms a classification anticipated by M. Furushima in 1989. I will discuss the main ideas of the proof, which uses the classification of smooth complex affine surfaces according to logarithmic Kodaira dimension.

Takashi Kishimoto (Saitama University)

Title: Rationality and Cylindricity of weighted Fano threefold hypersurfaces

The rationality (resp. cylindricity) problem of Mori fiber spaces with mild singularities is an important concept in birational (resp. affine) geometry, and they are related to some extent via MMP. The Fano varieties in weighted projective spaces yield an important and at the same time handy building block of Mori fiber spaces. In the talk, we will focus on the (stable) rationality and cylindricity of certain quasi-smooth weighted Fano threefold hypersurfaces with klt singularities. This is based on the joint work in progress with Adrien Dubouloz, In-Kyun Kim and Joonyeong Won.

Dibyendu Mondal (Indian Institute of Technology, Indore)

Title: Isotropy Groups of Some Polynomial Derivations

In this talk, we discuss the isotropy group of a derivation of $k[x_1, \ldots, x_n]$, the group of k-automorphisms commuting with it, for monomial derivations and for non-invertible simple derivations. We show that for special monomial derivations this group is $(\mu_{d_1} \times \cdots \times \mu_{d_n}) \rtimes K$, determined by the Smith normal form and the centralizer K of the exponent matrix, and for Jouanolou-type derivations $J(n, r, \sigma)$ it is $\prod_m \left(\mu_{r^m-1}^{l_m} \rtimes G(m, 1, l_m)\right)$, where m runs over the cycle lengths of σ. We also present conditions under which simple extensions of non-invertible derivations have isotropy groups consisting only of translations, thereby confirming Yan's conjecture for a broad new class. This talk is based on joint work with Dr. Sumit Chandra Mishra and Mr. Pankaj Shukla.

21st November (Saturday)

Nobuharu Onoda (University of Fukui)

Title: On isomorphism classes of Specker algebras

Let R be an integral domain and A an R-algebra. Then A is called a Specker R-algebra if A is generated by idempotents over R and torsion-free as an R-module. It is known that such A is completely determined by its Boolean algebra formed by idempotents. In this talk, under moderate assumptions we determine the structures of Specker R-algebras with concrete examples.

Sanjay Singha (Indian Statistical Institute, Kolkata)

Title: Finite Generation of Locally Nilpotent Derivations of $R[X, Y, Z]$

Let R be a Noetherian UFD containing $\mathbb{Q}$ and $B = R[X, Y, Z]$. We show that, under certain conditions, the kernel of the following type of R-derivations D of B is generated by at most 3 elements over R:

a) D is an extension of an R-elementary derivation D_0 of $R[X, Y]$ such that $D(Z) \in \ker(D_0)$ or $D(Z)$ is a homogeneous polynomial in X and Y with respect to the standard grading.

b) D is a nice R-derivation satisfying $D(R[X, Y]) \subseteq R[X, Y]$ and $D(X), D(Y)$ form a regular sequence or are comaximal in $R[X, Y]$.

c) D is triangular monomial.

d) D is triangular defined by $D(X) = f \in R$, $D(Y), D(Z) \in R[X]$.

e) D is an extension of an irreducible triangular R-derivation D_0 of $R[X, Y]$ such that $D(Z) \in \ker(D_0)$.

We also show that if D is an extension of a non-triangularizable R-derivation D_0 of $R[X, Y]$ and $D(Z) \in \ker(D_0)$, then the number of generators of $\ker(D)$ is finite.

We find a set of generators of the kernel of Daigle–Freudenburg type triangular derivations of $k^{[5]}$ for:

(i) $m \geq 3$ and $1 \leq r \leq m/3$,

(ii) $(2m, m)$ for $m \geq 1$, and

(iii) $(5, 2)$, $(5, 3)$, $(7, 3)$, and $(8, 3)$.

Masatomo Sawahara (Hirosaki University)

Title: Polarized cylinders in singular del Pezzo surfaces

The existence of polarized cylinders in Fano varieties has been actively studied, partly due to its applications to unipotent group actions on affine varieties. We focus on two-dimensional Fano varieties so-called del Pezzo surfaces. For del Pezzo surfaces with at most Du Val singularities, the existence conditions for polarized cylinders are now almost completely understood. In this talk, we will present results on the existence of polarized cylinders on log del Pezzo surfaces obtained by blowing up points in general position on the weighted projective plane $\mathbb{P}(1, 1, m)$. Part of this talk is based on joint work with In-Kyun Kim and Joonyeong Won.

Sourav Sen (SRM University-AP)

Title: Automorphism groups and non-equivalent embeddings of certain class affine algebraic varieties

In this talk we shall discuss the automorphism group structure of double Danielewski surfaces. We shall also show the existence of non-equivalent embeddings of certain class of affine algebraic varieties into complex affine space of suitable dimension.