Alexey Elagin (University of Sheffield)
Atomic theory for the derived categories of surfaces
There is an old idea that birational geometry (in particular, the Minimal Model Program) can and should be translated into the language of derived categories. We revive this idea by constructing "atomic" semi-orthogonal decompositions of derived categories of smooth algebraic surfaces, over any perfect field or in G-equivariant setting. "Atoms" of these decompositions provide birational invariants of surfaces, similar to invariants studied by Lin–Shinder–Zimmermann and Auel–Bernardara. After constructing "atomic" theory, I will explain the role that "atoms" can play in the classification of geometrically rational surfaces over non-closed fields. This is a joint work with Evgeny Shinder and Julia Schneider, and the idea goes back to Kontsevich and quantum cohomology.

Chen Jiang (Fudan University)
Degree of canonical Fano 3-folds
We show that the degree of a canonical weak Fano 3-fold is at most 72. This upper bound is optimal. Previously this is known for Gorenstein canonical weak Fano 3-folds proved by Prokhorov (known as Fano–Iskovskikh Conjecture). I will explain the proof for the Picard number 1 case (joint work with Haidong Liu and Jie Liu) and the general case (joint work with Tianqi Zhang and Yu Zou).

Konstantin Loginov (Steklov Institute)
Abelian groups of K3 type acting on rationally connected varieties
This talk addresses the classification of finite abelian subgroups in the automorphism groups of rationally connected varieties. This is a classical problem, with its origins going back to the late 19th century. An interesting dichotomy arises in dimension two: the finite abelian subgroups of Cremona group of rank 2 can be divided into two types. The first type consists of groups that can act on a Mori fiber space with non-trivial base (that is, on a conic bundle). The second, "exceptional" type, corresponds to elliptic curves with complex multiplication anti-canonically embedded in certain del Pezzo surfaces. We try to extend this observation to higher dimensions. In general, such exceptional abelian groups should originate from highly symmetric Calabi-Yau subvarieties found in birational modifications of the original rationally connected variety. In dimension 3, this role is played by anti-canonically embedded K3 surfaces of higher Picard rank, leading to a complete classification with exactly four exceptional groups. While these groups are realizable, their embedding into the Cremona group of rank 3 remains an open problem. We will also explore the extension problem for finite abelian groups and its connection to the geometry of 4-dimensional Mori fiber spaces.

Vladimir Shein (Northwestern University)
Singularities in the Grothendieck ring of varieties and motivic zeta functions
For a singular variety X, one can define several "motivic" types of singularities using the Grothendieck ring of varieties. One of them is the notion of $\mathbb{L}$-rational singularities, introduced by Nicaise and Shinder in their work on the specialization of stable birationality.

The question of when quotient varieties X/G have $\mathbb{L}$-rational singularities turns out to be particularly interesting. I will discuss some results in this direction, in particular a proof that symmetric powers of smooth varieties have $\mathbb{L}$-rational singularities. I will then explain how one can use this result to prove the irrationality of motivic zeta functions for a large class of varieties, generalizing a method of Larsen and Lunts to higher dimensions. If time permits, I will also discuss some other applications and open questions.