



ACCADEMIA NAZIONALE DEI LINCEI



THE KOREAN ACADEMY OF  
SCIENCE AND TECHNOLOGY

---

CONFERENCE

## NEW FRONTIERS IN ALGEBRA AND GEOMETRY

15-16 OCTOBER 2025

*Scientific Organizing Committee:* Enrico ARBARELLO (Linceo, Sapienza Università di Roma), Fabrizio CATANESE (coordinatore, Linceo, Universität Bayreuth), Ciro CILIBERTO (Linceo, Università degli Studi Tor Vergata), Jong Hae KEUM (CMC-Center for Mathematical Challenges – KIAS-Korea Institute for Advanced Study), Emanuele MACRÌ (Linceo, Université Paris-Saclay), Kieran Gregory O'GRADY (Linceo, Sapienza Università di Roma), Claudio PROCESI (Linceo, Sapienza Università di Roma), Claire VOISIN (Linceo, Institut de Mathématiques de Jussieu-Paris), Umberto ZANNIER (Linceo, Scuola Normale Superiore).

### PROGRAMME

A primary goal of this Meeting will be to witness and foster the existing close ties and cooperations between Korean and Italian mathematicians, in the fields related to Algebra and Geometry, with a particular emphasis on Algebraic Geometry, a major field of mathematical research and knowledge.

A second goal, in a historical moment where scientific research is extremely specialized, also in mathematics, is to be a forum of frank and open interdisciplinary discussion in the field of mathematics, highlighting the interconnections of algebra, geometry and combinatorics, leading to a unified building of knowledge meant to reverberate on other disciplines, as Physics for instance.

Algebra, geometry and combinatorics are all fields of exact calculations, as opposed to the numerical approximations and iterative methods: and the complexity of these calculations is overcome by the overarching principle of symmetry and geometrical representations.

In the end, algebra may invoke the construction of combinatorial objects, or, as in the theory of linear series, and the theory of crystallographic groups, of convex geometry.

In turn, algebro-geometric methods, as the hard Lefschetz theorems, may lead to the solution of long standing problems in commutative algebra and combinatorics (as witnessed by a recent Fields medal award).

Groups of transformations are the key to the Symmetry principle, and here we encounter finite groups of symmetries, as well as infinite Lie Groups, and their differential geometric properties, and related differential equations.

Complex geometry, but also positive characteristic and arithmetic geometry intertwine to lead to the solution to deep open problems: and the scenario is by and large still far from being fully uncovered.

### Wednesday 15 October

10.00 *Welcome addresses*

Carlo DOGLIONI (Vice President of the Accademia Nazionale dei Lincei)

Jeong Han KIM (Vice President of KAST - The Korean Academy of Science and Technology)

10.15 Jun-Muk HWANG (IBS - Institute for Basic Science): *Holomorphic symplectic geometry of elliptic surfaces*

10.45 *Discussion*

10.55 Yongnam LEE (IBS-Center for Complex Geometry): *Compact moduli of elliptic surfaces with multiple fibers*

11.25 *Discussion*

11.35 Coffee break

- 11.50 Sijong KWAK (KAIST - Korea Advanced Institute of Science and Technology.): *Gonality Sequence of A Smooth Curve and Syzygies of Secant Varieties*
- 12.20 *Discussion*
- 12.30 Ciro CILIBERTO (Linceo, Università degli Studi Tor Vergata): *Boundary divisors in the moduli spaces of stable Horikawa surfaces with  $K^2 = 2p_g - 3$*
- 12.50 *Discussion*
- 13.00 Break
- 
- 14.30 Jong Hae KEUM (CMC-Center for Mathematical Challenges – KIAS-Korea Institute for Advanced Study): *Combinatorially minimal mori dream surfaces of general type*
- 15.00 *Discussion*
- 15.10 Young-Hoon KIEM (KIAS - Korea Institute for Advanced Study): *Generalized sheaf counting*
- 15.40 *Discussion*
- 15.50 Coffee break
- 16.05 Jeong Han KIM (KIAS-Korea Institute for Advanced Study - Vice President of KAST-The Korean Academy of Science and Technology): *Asymptotic bounds for Ramsey numbers*
- 16.35 *Discussion*
- 16.45 Kieran Gregory O'GRADY (Linceo, Sapienza Università di Roma): *General polarized HK varieties of Type  $K3^{[a^2+1]}$  as moduli spaces of sheaves*
- 16.55 *Discussion*

#### Thursday 16 October

- 10.00 Claudio PROCESI (Linceo, Sapienza Università di Roma): *From determinants to Cayley Hamilton algebras*
- 10.30 *Discussion*
- 10.40 Fabrizio CATANESE (Linceo, Universität Bayreuth): *Fake homology and homotopy quadrics, Surfaces isogenous to a Product, and numerically trivial automorphisms of surfaces*
- 11.10 *Discussion*
- 11.20 Coffee break
- 11.35 Barbara FANTECHI (Linceo, SISSA Trieste): *Smoothing of projective schemes with lci singularities*
- 12.05 *Discussion*
- 12.15 Lucia CAPORASO (Università di Roma Tre): *Hyperbolicity of log-surfaces and hypertangency of curves*
- 12.45 *Discussion*
- 12.55 Break

- 14.30 Paola FREDIANI (Università di Pavia): *Asymptotic directions in the moduli space of curves*  
15.00 *Discussion*
- 15.10 Rita PARDINI (Università di Pisa): *Surfaces with canonical map of odd degree*  
15.40 *Discussion*
- 15.50 Jihun PARK (Pohang University of Science and Technology - POSTECH): *Unipotent group actions on affine hypersurfaces*  
16.20 *Discussion*
- 16.30 Coffee break
- 16.45 Jongil PARK (Seoul National University - SNU): *A study of rational homology projective planes*  
17.15 *Discussion*

ROMA – PALAZZO CORSINI- VIA DELLA LUNGARA, 10  
Segreteria del convegno: [convegni@lincei.it](mailto:convegni@lincei.it) – <http://www.lincei.it>

Tutte le informazioni per partecipare al convegno sono disponibili su:  
All information for attending the conference is available at:  
<https://www.lincei.it/it/manifestazioni/new-frontiers-algebra-and-geometry>

Per partecipare al convegno è necessaria l'iscrizione online  
Fino alle ore 10 è possibile l'accesso anche da Lungotevere della Farnesina, 10  
I lavori potranno essere seguiti dal pubblico anche in streaming  
Online registration is required to attend the conference.  
Until 10 a.m. access is also possible from Lungotevere della Farnesina 10.  
The conference can also be followed by streaming.

L'attestato di partecipazione al convegno viene rilasciato esclusivamente a seguito di partecipazione in presenza fisica e deve essere richiesto al personale preposto in anticamera nello stesso giorno di svolgimento del convegno  
The certificate of participation in the conference will be issued only following on attendance in presence and must be requested to the staff in charge on the same day of the conference.