Research Highlight: Rationality of homogeneous varieties

Work of Associate Professor CHIN Chee Whye and Professor ZHANG De-Qi

Given a finite-dimensional vector space V over an algebraically closed field k and connected algebraic subgroup H of GL(V), one asks about the rationality of the quotient variety V/H; this generalizes the rationality problem asked by Noether one hundred years ago. The answer is still open.

Professors Chin and Zhang consider the more generalized rationality problem for the homogeneous quotient variety G/H, where G is a connected linear algebraic group and H a connected closed subgroup. In [CZ17], they confirmed its rationality when dim(G/H) is at most 10, or when H has maximal rank and the maximal semisimple quotient of G is isogenous to a product of almost-simple groups of type A or C. In dimension 11, the rationality of G_2/PGL_2 is still unknown.

Reference:

[CZ17] C.W. Chin and D.Q. Zhang, "Rationality of homogeneous varieties". Transactions of the American Mathematical Society, **369**, no. 4 (2017): 2651-2673.