'(Non)Rationality of hypersurfaces'

Summer term 2015, Tuesday 2-4pm, 0.011

There has been recent progress in the question of which unirational hypersurfaces are rational. Classical results, going back to Clemens, Griffiths, Manin et al, show e.g. that smooth cubic and quartic hypersurfaces in $\mathbb{P}^4$ are not rational. Already in dimension four the situation is more difficult, e.g. no smooth cubic in $\mathbb{P}^5$ is known to be non-rational. In particular we would like to understand new techniques involving torsion in the Chow group originated by Voisin.

The program and in particular the dates are provisional. For further information or if you want to give a talk in the seminar, please contact one of us huybrech@ or schreied@.

14 April:
- **Introduction [1, 6]**; (Stefan Schreieder)
- **Cubics and the Fano variety of lines I[5, 9]**; (Luigi Lombardi)

21 April:
- **Cubics and the Fano variety of lines II[5, 9]**; (Luigi Lombardi)
- **Decomposition of the diagonal à la Bloch–Srinivas I [4]**; (Ulrike Rieß)

28 April:
- **Decomposition of the diagonal à la Bloch–Srinivas II[4]**; (Ulrike Rieß)
- **Universal cycles I [12]**; (Daniel Huybrechts)

5 May:
- **Universal cycles II [12]**; (Daniel Huybrechts)
- **Universal trivial Chow for cubics I [13]**; (Andrey Soldatenkov)

12 May:
- **Universal trivial Chow for cubics II [13]**; (Andrey Soldatenkov)

19 May:
- **Quartic threefolds [7]**: (Stefan Schreieder)

9 June:
Bloch–Ogus theory [8, 14]; (Yohan Brunebarbe)

16 June:
Hypersurfaces that are not stably rational [10, 11]; (Vlad Lazić(?), Luca Tasin)

23 June:
Unramified chomology [8] or further examples [2, 3]; (??)

30 June:
Unramified chomology [8] or further examples [2, 3]; (??)

References

[1] Arnaud Beauville *The stable Lüroth problem.* Talk `http://math.unice.fr/~beauvill/conf/StabLuroth.pdf`

[2] Arnaud Beauville *A very general quartic double fourfold or fivefold is not stably rational.* arXiv:1411.3122.

[3] Arnaud Beauville *A very general sextic double solid is not stably rational.* arXiv:1411.7484.

[4] Spencer Bloch, V. Srinivas. *Remarks on correspondences and algebraic cycles.* Amer. J. of Math. 105 (1983) 1235–1253.

[5] Lev Borisov *Class of the affine line is a zero divisor in the Grothendieck ring.* arXiv:1412.6194.

[6] Jean-Louis Colliot-Thélène *General quartic threefolds are not stably rational .* Talk IAS. March 2015 `http://www.math.u-psud.fr/~colliot/IAS_mars_2015.pdf`.

[7] Jean-Louis Colliot-Thélène, Alena Pirutka *Hypersurfaces quartiques de dimension 3 : non rationalité stable.* arXiv:1402.4153.

[8] Jean-Louis Colliot-Thélène, Claire Voisin *Cohomologie non ramifiée et conjecture de Hodge entière.* arXiv:1005.2778.

[9] Sergey Galkin, Evgeny Shinder *The Fano variety of lines and rationality problem for a cubic hypersurface.* arXiv:1405.5154.

[10] Janós Kollár. *Nonrational hypersurfaces.* JAMS 8 (1995), 241–249.

[11] Burt Totaro *Hypersurfaces that are not stably rational.* arXiv:1502.04040.

[12] Claire Voisin *Unirational threefolds with no universal codimension 2 cycle.* arXiv:1312.2122.

[13] Claire Voisin *On the universal CH_0 group of cubic hypersurfaces.* arXiv:1407.7261.

[14] Claire Voisin *Degree 4 unramified cohomology with finite coefficients and torsion codimension 3 cycles.* `http://webusers.imj-prg.fr/~claire.voisin/Articlesweb/hquatrenr.pdf`.