Curriculum Vitae

Positions

Jan 2022–, Associate professor, **Kobe university** Japan

Oct 2020 –Dec 2021, Assistant professor (tenured), **Kobe university** Japan

Oct 2015 – Sep 2020, Assistant professor (tenure track), **Kobe university** Japan

Apr 2015 – Sep 2015, JSPS Post-doc, **Kyoto university** Japan
   Mentor: Prof. Yoshinori Namikawa

Mar 2014 – Mar 2015, Post-doc, **Max Planck Institute for Mathematics** Germany
   Mentor: Prof. Daniel Huybrechts

Education

Oct 2010 – Feb 2014, Ph.D. in Mathematics, **University of Warwick** UK
   Advisor: Prof. Miles Reid
   Thesis: Deformations of $\mathbb{Q}$-Fano 3-folds and weak Fano manifolds.
   (Viva finished on 28th Feb 2014, Awarded the degree on 28th April 2014.)

Apr 2009 – Sep 2010 (moved to Warwick), Ph.D. in Mathematics, **The University of Tokyo**, Japan
   Advisor: Prof. Yujiro Kawamata

Apr 2007 – Mar 2009, M.Sc. in Mathematics, **The University of Tokyo**, Japan
   Advisor: Prof. Yujiro Kawamata
   Thesis: Seshadri constants on del Pezzo surfaces

Apr 2003 – Mar 2007, B.Sc. in Mathematics, **The University of Tokyo**, Japan

Research Interests

Algebraic geometry: deformation theory, Fano varieties, Calabi-Yau varieties.

Selected Awards & Honors

Research Scholarship, Warwick Postgraduate Research Scholarship, University of Warwick, October 2010– September 2013 (+ 6 months).

Research Scholarship, JSPS Research Fellowship for Young Scientists (DC2), The University of Tokyo, April 2010- September 2010.

Research Assistant, GCOE Research Assistantship, The University of Tokyo, April 2009- March 2010.

Publications

1. T. Sano, *Seshadri constants on rational surfaces with anticanonical pencils*, Journal of Pure and Applied Algebra 218 (2014), pp. 602-617, DOI: http://dx.doi.org/10.1016/j.jpaa.2013.07.007.

2. T. Sano, *On deformations of $\mathbb{Q}$-Fano 3-folds*, Journal of Algebraic Geometry, 25 (2016), pp. 141–176. DOI: http://dx.doi.org/10.1090/jag/672

3. T. Sano, *Unobstructedness of deformations of weak Fano manifolds*, International Mathematics Research Notices, Vol. 2014, No. 18, pp. 5124–5133. DOI: http://dx.doi.org/10.1093/imrn/rnt116.

4. T.Sano, *On deformations of $\mathbb{Q}$-Fano 3-folds II*, J. Reine Angew. Math., 730 (2017), 251–261.

5. T.Sano, *Deforming elephants of $\mathbb{Q}$-Fano 3-folds*, Jounal of the London Mathematical Society, Volume 95, Issue 1, pp. 23–51. DOI: 10.1112/jlms.12000.

6. M.Pizzato, T.Sano, L.Tasin, *Effective non-vanishing for Fano weighted complete intersections*, Algebra and Number Theory, 11 (2017), no. 10, 2369–2395.

7. T.Sano, *Deformations of weak $\mathbb{Q}$-Fano 3-folds*, Internat. J. Math. 29 (2018), no. 7, 1850049, 23 pp.

8. S.Coughlan, T.Sano, *Smoothing cones over K3 surfaces*, Épijournal Geom. Algébrique 2 (2018), Art. 15, 10 pp.

9. K. Hashimoto, T.Sano, *Examples of non-Kähler Calabi-Yau 3-folds with arbitrarily large b_2*, Geom. Topol. 27 (2023), no. 1, 131–152.

10. T.Sano, *Examples of non-Kähler Calabi-Yau manifolds with arbitrarily large b_2*, J. Topol. 14 (2021), no. 4, 1448–1460.

11. T.Sano, *On birational boundedness of some Calabi-Yau hypersurfaces*, Springer Proc. Math. Stat., 409 Springer, Cham, 2023, 839–855.

12. T.Sano, *Construction of non-Kähler Calabi-Yau manifolds by log deformations*, to appear in Proceedings of Nottingham Algebraic Geometry Seminar.

13. T.Sano, L.Tasin, *On K-stability of Fano weighted hypersurfaces*, Algebr. Geom. 11 (2024), no. 2, 296–317.

14. Y.Liu, T.Sano, L.Tasin, *Infinitely many families of Sasaki-Einstein metrics on spheres*, to appear in Journal of Differential Geometry.

Preprints

- S.Okawa, T.Sano, *On the noncommutative rigidity of the moduli stack of stable pointed curves*, preprint.
- T.Sano, *On Hodge structures of compact complex manifolds with semistable degenerations*, preprint.
- T.Sano, L.Tasin, *Delta invariants of weighted hypersurfaces*, preprint.

Teaching Experience

- Intensive lectures on algebraic geometry, June 2018, Saitama university.
- Algebra II, Fall 2019, Kobe university.
- Analysis III, Spring 2017 (with Tatsuya Koike), Spring 2018, 2019, 2020, Kobe university.
- Linear Algebra V, Spring 2017, 2018, 2019, Kobe university.
- Introduction to Analysis IIa and IIb, Fall 2016, Winter 2017, Kobe university.
- Linear Algebra I, II, Spring 2016, 2020(in English), Kobe university.
- Reading seminar (Suugaku-Engi), Winter 2015, Kobe university.

- Supervisor for Undergraduate students; Fall-spring 2011, Fall 2012, University of Warwick.
- Teaching Assistant; Ring theory, Fall 2011, Vector analysis, Fall 2012, University of Warwick.
- Teaching Assistant; Algebra, Summer 2007; Linear Algebra, Summer-Winter 2008; Calculus, Summer 2009; Algebra, Winter 2009, The university of Tokyo.

Invited talks

- On K-stability of Fano weighted hypersurfaces, Explicit Birational Geometry seminar, 29th Dec. 2021, online (Zoom).
- Construction of non-Kähler Calabi-Yau manifolds by log deformations, Tokyo-Kyoto Algebraic Geometry seminar, 14th Dec. 2021, online (Zoom).
- On K-stability of Fano weighted hypersurfaces, Osaka Algebraic Geometry seminar, 13th Dec. 2021, online (Zoom).
- Construction of non-Kähler Calabi-Yau manifolds by log deformations, Emmy Noether Kolloquium, 19th May. 2021, online (Zoom).
- Construction of non-Kähler Calabi-Yau manifolds by log deformations, Online Algebraic Geometry seminar, 18th Mar. 2021, online (Teams).
- Birational boundedness of some Calabi-Yau hypersurfaces, Zoom Algebraic Geometry seminar, 16rd Mar. 2021, online (Zoom).
- Birational boundedness of some Calabi-Yau hypersurfaces, Tokyo-Kyoto Algebraic Geometry seminar, 13rd Jan. 2021, online (Zoom).
- On log deformations of normal crossing Calabi-Yau varieties, Aspects of Mirror Symmetry, 16th Sep, 2020, online (Zoom).
- Construction of non-Kähler Calabi-Yau 3-folds by log deformations, Geometry Seminar (Osaka university), 6th July, 2020, online (Zoom).
- Deformations of Fano and Calabi-Yau varieties (5 talks), COMPLEX ALGEBRAIC GEOMETRY WINTER SCHOOL, 27th Jan-1st Feb, 2020, Nesin Mathematics Village.
- Construction of Calabi-Yau manifolds by log deformations, Niigata Algebra seminar, 10. Jan. 2020, Niigata university.
- On log deformations of degenerate Calabi-Yau varieties, Yufuin Algebraic Geometry Workshop, 27. Dec. 2019, Nihon Bunri university.
- On log deformations of degenerate Calabi-Yau varieties, Birational Geometry, Kähler-Einstein metrics and Degenerations, 18. Nov, IBS center for Geometry and Physics.
- On log deformations of degenerate Calabi-Yau varieties, Algebraic geometry seminar, 5. Nov. 2019, University of Milan.
- Deformations of Fano and Calabi-Yau varieties (3 talks), Groups, Arithmetic & Algebraic Geometry Seminar, 30,31.Oct. & 1.Nov., EPFL.
- On log deformations of degenerate Calabi-Yau varieties, Mini Workshop on Geometry of Moduli Spaces , 10. Oct. 2019, Kobe university.
- Construction of non-Kähler Calabi-Yau 3-folds by log deformations, Younger generations in Algebraic and Complex geometry, 6. Aug. 2019, Okayama University.
- Construction of non-Kähler Calabi-Yau 3-folds by smoothing normal crossing varieties, Algebraic Geometry seminar, 9.Jul. 2019, The university of Tokyo.
- Construction of non-Kähler Calabi-Yau 3-folds by log deformations, Birational Geometry, Kähler-Einstein metrics and Degenerations,10.Jun. 2019, Shanghai Tech. University.
- Construction of non-Kähler Calabi-Yau 3-folds by smoothing normal crossing varieties, Algebraic Geometry International Conference, 7.Jun. 2019, KIAS.
- On quasi-smooth weighted complete intersections, The 17th Affine Algebraic Geometry Meeting, Mar. 2019, Kanswei Gakuin University (Umeda).

- Construction of non-Kähler Calabi-Yau 3-folds by smoothing normal crossing varieties, Algebraic geometry seminar, Jan. 2019, Kyoto university.
- Construction of non-Kähler Calabi-Yau 3-folds by smoothing normal crossing varieties, Geometry& Mathematical Physics seminar, Nov. 2018, Loughborough university.
- Construction of non-Kähler Calabi-Yau 3-folds by log deformations, Algebraic Geometry seminar, Nov. 2018, University of Warwick.
- Construction of non-Kähler Calabi-Yau 3-folds by smoothing normal crossing varieties, Birational geometry and related topics, Nov. 2018, Fudan university (SCMS).
- Construction of Calabi-Yau manifolds by log deformation theory, Algebra seminar, Oct. 2018, Kobe university.
- Effective non-vanishing for weighted complete intersections, Geometry of Projective varieties and related topics 2018, Oct. 2018, Kochi university of technology.
- On deformations of log Calabi-Yau varieties, 代数学シンポジウム (Algebra Symposium), Sep. 2018, Tokyo Institute of Technology.
- On log deformations of Calabi-Yau varieties, ホッジ理論と代数幾何学 (Hodge theory and algebraic geometry), Aug. 2018, Tokyo Denki University.
- On deformations of log Calabi-Yau varieties, Colloquium, Jun. 2018, Saitama university.
- Log deformations of VNC Calabi-Yau varieties, Positivity in algebraic geometry, Jun. 2018, Yonsei university.
- Log deformations of VNC Calabi-Yau varieties, Algebra seminar, May. 2018, Tohoku university.
- Effective non-vanishing for weighted complete intersections, Higher dimensional algebraic geometry, Mar. 2018, The university of Tokyo.
- Effective non-vanishing for weighted complete intersections, Algebra Seminar, Oct. 2017, Hiroshima university.
- Effective non-vanishing for weighted complete intersections, Algebra Seminar, Oct. 2017, Kobe university.
- Effective non-vanishing for weighted complete intersections, the 4-th Seoul Seminar on Algebraic Geometry, May. 2017, Start up Campus (Pangyo, Korea).
- Deformations of Calabi-Yau/Fano varieties (3 talks), Current Topics in Algebraic and Symplectic Geometry, Mar. 2017, Kyoto University.
- Deformations of cones over K3 surfaces, THE 15TH AFFINE ALGEBRAIC GEOMETRY MEETING, Mar. 2017, Kwansei Gakuin University (Umeda).
- Log deformations of VNC Calabi-Yau varieties, The 2nd Higher dimensional algebraic geometry Echigo Yuzawa symposium, Feb. 2017, Yuzawa-cho Kouminkan.
- Log deformations of VNC Calabi-Yau varieties, the 4th workshop on Algebraic Geometry -Ube-, Jan. 2017, National Institute of Technology (Ube College).
- Log deformations of Calabi-Yau varieties, Algebra seminar, Oct. 2016, Kobe university.
- Deformations of cones over K3 surfaces, Tsuda College and OIST joint workshop on Calabi-Yau varieties: Arithmetic, Geometry and Physics, Aug. 2016, The university of Tokyo.
- Deformations of cones over K3 surfaces, Waseda Algebraic geometry seminar, May. 2016, Waseda university.
- Bound of singularities on Q-Fano 3-folds, Workshop on Hyperplane Arrangements and Singularity Theory, Mar. 2016, Hokkaido university.
- Deformations of cones over K3 surfaces, Algebraic geometry seminar, Mar. 2016, Rome Tre university.
- Deformations of cones over K3 surfaces, 11th Daisuu-Kaiseki-Kikagaku seminar, Feb. 2016, Kagoshima university.

- A bound of singularities on a $\mathbb{Q}$-Fano 3-fold, "Higher dimensional algebraic geometry and around, Kobe-Kyoto," Feb. 2016, Kobe university.
- Deformations of $\mathbb{Q}$-Fano 3-folds, Workshop on deformation and moduli, Jan. 2016, Riviera Hotel (Busan).
- A bound of singularities on a $\mathbb{Q}$-Fano 3-fold, Singularities and invariants on higher dimensional algebraic varieties, Dec. 2015, RIMS.
- "Deformations of Fano varieties" and "A bound of singularities on a $\mathbb{Q}$-Fano 3-fold", Algebraic geometry seminar, Dec. 2015, KIAS.
- Deformations of cones over K3 surfaces, Algebra Seminar, Nov. 2015, Kobe university.
- Deformations of Fano varieties, Colloquium, Nov. 2015, Kobe university.
- Introduction to the paper by Cantat-Lamy, Tambara Algebraic Geometry Seminar, Sep. 2015, Tambara Institute of Mathematical Sciences.
- Deformations of cones over K3 surfaces, Sep. 2015, Oberseminaire, Leibniz Universität Hannover.
- Deformations of cones over K3 surfaces, Aug. 2015, Higher Dimensional Algebraic Geometry, National Taiwan University.
- Deformations of weak Fano varieties, May. 2015, Algebraic Geometry Seminar, the University of Tokyo.
- Unobstructed deformations of Fano varieties, Apr. 2015, Algebraic Geometry Seminar, Kyoto university.
- Deforming elephants of $\mathbb{Q}$-Fano 3-folds, Oct. 2014, Kinosaki Symposium on algebraic geometry 2014, Kinosaki International Arts center.
- Deformations of Fano varieties, Sep. 2014, Oberseminar, Max Planck Institute for Mathematics.
- Deforming elephants of $\mathbb{Q}$-Fano 3-folds, Feb. 2014, Birational geometry and foliations, Hausdorff Institute for Mathematics.
- Deforming elephants of $\mathbb{Q}$-Fano 3-folds, Jan. 2014, Algebraic geometry seminar, The university of Tokyo.
- Deformations of Fano 3-folds with terminal singularities, Oct. 2013, Algebraic geometry seminar, Princeton university.
- Deformations of weak Fano manifolds, Sep. 2013, Calf seminar, University of Warwick.
- Deformations of weak Fano manifolds, Jun. 2013, Algebraic geometry and Complex geometry seminar, Osaka university.
- Deformations of Fano 3-folds with terminal singularities, Jan. 2013, MAGIC seminar, Imperial College London.
- Deformations of Fano 3-folds with terminal singularities, Jan. 2013, Workshop on birational geometry, The university of Tokyo.
- Deformations of Fano 3-folds with terminal singularities, Jun. 2012, NCTS/TPE Seminar in Algebraic Geometry, National Taiwan University.
- Deformations of Fano 3-folds with terminal singularities, Jun. 2012, Algebraic geometry seminar, Ajou university.
- Deformations of Fano 3-folds with terminal singularities, May. 2012, WCU workshop on classification and construction of algebraic varieties, Busan (Seacloud Hotel).
- Deformations of Fano 3-folds with terminal singularities, Apr. 2012, Homological Methods in Algebraic Geometry, Steklov Mathematical Institute.
- Deformations of singular Fano 3-folds, April. 2012, YRM 2012, University of Bristol.
- Deformation theoretic approach to the classification of singular Fano 3-folds, Mar. 2012, Calf seminar, University of Warwick.

- Deformations of Fano 3-folds with terminal singularities, Feb. 2012, Korova@Warwick Day, University of Warwick.
- Deformations of Fano 3-folds with terminal singularities, Feb.,2012, Algebraic Geometry Seminar, University of Warwick.
- Seshadri constants on rational surfaces with anticanonical pencils, Dec., 2009, Algebraic Geometry Seminar, Nagoya university.
- Seshadri constants on rational surfaces with anticanonical pencils, Nov., 2009, Geometry of Projective Varieties and Related Topics, 2009, Kochi university.
- Seshadri constants on rational surfaces with anticanonical pencils, Oct., 2009, Kinosaki Algebraic Geometry Symposium(poster session), Kinosaki conference hall.
- Seshadri constants on rational surfaces with anticanonical pencils, Oct., 2009, Algebraic Geometry Seminar, Kyushu university.
- Introduction to the papers by Gross-Siebert, Jul, 2009, Tambara Algebraic Geometry Summer School, Tambara Institute of Mathematical Sciences.
- Seshadri constants on rational surfaces with anticanonical pencils, Jul., 2009, Algebraic Geometry Seminar, The university of Tokyo.
- Seshadri constants on rational surfaces with anticanonical pencils, May., 2009, Singularity Seminar, Nihon university.
- Seshadri constants on rational surfaces with anticanonical pencils, Feb., 2009, The 6th Kinosaki Newcomer Seminar, Kinosaki Conference hall.

Visiting

- April 2011, May 2012, Sogang University, Seoul, South Korea.

- April 2012, Steklov Mathematical Institute, Moscow, Russia.

- June 2012, National Taiwan University, Taipei, Taiwan.

- October-December 2013, Princeton University, New Jersey, USA.

Services

- Reviewed papers to some journals.

References

Miles Reid, University of Warwick, UK
> *Email*: `Miles.Reid@warwick.ac.uk`

Alessio Corti, Imperial College London, UK
> *Email*: `a.corti@imperial.ac.uk`

Yujiro Kawamata, The University Tokyo, Japan
> *Email*: `kawamata@ms.u-tokyo.ac.jp`

Yoshinori Namikawa, Kyoto university, Japan
> *Email*: `namikawa@math.kyoto-u.ac.jp`

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