References

- [1] Valery Alexeev and Michel Brion, Stable reductive varieties. I. Affine varieties, Invent. Math. 157 (2004), no. 2, 227–274.
- [2] Ayah Almousa, Juliette Bruce, Michael Loper, and Mahrud Sayrafi, *The virtual resolutions package for Macaulay2*, J. Softw. Algebra Geom. **10** (2020), no. 1, 51–60.
- [3] Marian Aprodu, Gavrill Farkas, Ştefan Papadima, Claudiu Raicu, and Jerzy Weyman, Koszul modules and Green's conjecture, Inventiones mathematicae (2019).
- [4] Dave Bayer and David Eisenbud, *Graph curves*, Adv. Math. **86** (1991), no. 1, 1–40. With an appendix by Sung Won Park.
- [5] Aaron Bertram, Lawrence Ein, and Robert Lazarsfeld, Vanishing theorems, a theorem of Severi, and the equations defining projective varieties, J. Amer. Math. Soc. 4 (1991), no. 3, 587–602.
- [6] Manjul Bhargava and Bjorn Poonen, The local-global principle for integral points on stacky curves, Journal of Algebraic Geometry (2022). to appear.
- [7] Anna Maria Bigatti, Upper bounds for the Betti numbers of a given Hilbert function, Comm. Algebra 21 (1993), no. 7, 2317–2334.
- [8] Anthony Bonato, Juliette Bruce, and Ron Buckmire, Spaces for all: the rise of LGBTQ+ mathematics conferences, Notices Amer. Math. Soc. 68 (2021), no. 6, 998–1003.
- [9] Madeline Brandt, Juliette Bruce, Melody Chan, Margarida Melo, Gwyneth Moreland, and Corey Wolfe, On the top-weight rational cohomology of A_g , Geometry & Topology (2022). to appear.
- [10] Madeline Brandt, Juliette Bruce, Taylor Brysiewicz, Robert Krone, and Elina Robeva, *The degree of* $SO(n, \mathbb{C})$, Combinatorial algebraic geometry, Fields Inst. Commun., vol. 80, Fields Inst. Res. Math. Sci., Toronto, ON, 2017, pp. 229–246.
- [11] Juliette Bruce and Daniel Erman, A probabilistic approach to systems of parameters and Noether normalization, Algebra Number Theory 13 (2019), no. 9, 2081–2102.
- [12] Juliette Bruce and Wanlin Li, Effective bounds on the dimensions of Jacobians covering abelian varieties, Proc. Amer. Math. Soc. 148 (2020), no. 2, 535–551.
- [13] Juliette Bruce, Daniel Erman, Steve Goldstein, and Jay Yang, Conjectures and computations about Veronese syzygies, Exp. Math. 29 (2020), no. 4, 398–413.
- [14] _____, The Schur-Veronese package in Macaulay2, J. Softw. Algebra Geom. 11 (2021), no. 1, 83–87.
- [15] Juliette Bruce, Asymptotic syzygies in the setting of semi-ample growth (2019). Pre-print: arxiv:1904.04944.
- [16] _____, The quantitative behavior of asymptotic syzygies for Hirzebruch surfaces, J. Commut. Algebra 14 (2022), no. 1, 19–26.
- [17] ______, A word from... Juliette Bruce, Inaugural President of Spectra, Notices Amer. Math. Soc. 69 (2022), no. 6, 898–899.
- [18] Juliette Bruce, Daniel Corey, Daniel Erman, Steve Goldstein, Robert P. Laudone, and Jay Yang, Syzygies of $\mathbb{P}^1 \times \mathbb{P}^1$: data and conjectures, J. Algebra **593** (2022), 589–621.
- [19] Juliette Bruce, Lauren Cranton Heller, and Mahrud Sayrafi, Characterizing Multigraded Regularity on Products of Projective Spaces (2021). Pre-print: arxiv:2110.10705.
- [20] _____, Bounds on Multigraded Regularity (2022). Pre-print: arxiv:2208.11115.
- [21] Alina Bucur and Kiran S. Kedlaya, *The probability that a complete intersection is smooth*, J. Théor. Nombres Bordeaux **24** (2012), no. 3, 541–556 (English, with English and French summaries).
- [22] Weronika Buczyńska and Jarosław Buczyński, Apolarity, border rank, and multigraded Hilbert scheme, Duke Math. J. **170** (2021), no. 16, 3659–3702.

- [23] Dustin A. Cartwright, Daniel Erman, Mauricio Velasco, and Bianca Viray, *Hilbert schemes of 8 points*, Algebra Number Theory **3** (2009), no. 7, 763–795.
- [24] Karen A. Chandler, Regularity of the powers of an ideal, Comm. Algebra 25 (1997), no. 12, 3773–3776.
- [25] Ted Chinburg, Laurent Moret-Bailly, Georgios Pappas, and Martin J. Taylor, Finite morphisms to projective space and capacity theory, J. Reine Angew. Math. **727** (2017), 69–84.
- [26] Alessandro Chiodo, David Eisenbud, Gavril Farkas, and Frank-Olaf Schreyer, Syzygies of torsion bundles and the geometry of the level ℓ modular variety over \overline{M}_g , Invent. Math. **194** (2013), no. 1, 73–118.
- [27] S. Dale Cutkosky, Jürgen Herzog, and Ngô Viêt Trung, Asymptotic behaviour of the Castelnuovo-Mumford regularity, Compositio Mathematica 118 (1999), no. 3, 243–261.
- [28] Anand Deopurkar, The canonical syzygy conjecture for ribbons, Math. Z. 288 (2018), no. 3-4, 1157–1164.
- [29] Simon Donaldson and Song Sun, Gromov-Hausdorff limits of Kähler manifolds and algebraic geometry, II, J. Differential Geom. 107 (2017), no. 2, 327–371.
- [30] Theodosios Douvropoulos, Joachim Jelisiejew, Bernt Ivar Utstøl Nødland, and Zach Teitler, The Hilbert scheme of 11 points in A³ is irreducible, Combinatorial algebraic geometry, Fields Inst. Commun., vol. 80, Fields Inst. Res. Math. Sci., Toronto, ON, 2017.
- [31] David Eisenbud and Shiro Goto, Linear free resolutions and minimal multiplicity, J. Algebra 88 (1984), no. 1, 89–133.
- [32] David Eisenbud and Joe Harris, On varieties of minimal degree (a centennial account), Algebraic geometry, Bowdoin, 1985 (Brunswick, Maine, 1985), Proc. Sympos. Pure Math., vol. 46, Amer. Math. Soc., Providence, RI, 1987, pp. 3–13.
- [33] Lawrence Ein and Robert Lazarsfeld, Syzygies and Koszul cohomology of smooth projective varieties of arbitrary dimension, Invent. Math. 111 (1993), no. 1, 51–67.
- [34] _____, Asymptotic syzygies of algebraic varieties, Invent. Math. 190 (2012), no. 3, 603–646.
- [35] David Eisenbud, *The geometry of syzygies*, Graduate Texts in Mathematics, vol. 229, Springer-Verlag, New York, 2005. A second course in commutative algebra and algebraic geometry.
- [36] ______, Green's conjecture: an orientation for algebraists, Free resolutions in commutative algebra and algebraic geometry (Sundance, UT, 1990), Res. Notes Math., vol. 2, Jones and Bartlett, Boston, MA, 1992, pp. 51–78.
- [37] Jordan S. Ellenberg and Daniel Erman, Furstenberg sets and Furstenberg schemes over finite fields, Algebra Number Theory 10 (2016), no. 7, 1415–1436.
- [38] Daniel Erman and Jay Yang, Random flag complexes and asymptotic syzygies, Algebra Number Theory 12 (2018), no. 9, 2151–2166.
- [39] Gavril Farkas, Mircea Mustaţă, and Mihnea Popa, Divisors on $M_{g,g+1}$ and the minimal resolution conjecture for points on canonical curves, Ann. Sci. École Norm. Sup. (4) **36** (2003), no. 4, 553–581 (English, with English and French summaries).
- [40] Gavril Farkas and Michael Kemeny, *The generic Green-Lazarsfeld secant conjecture*, Invent. Math. **203** (2016), no. 1, 265–301.
- [41] ______, The Prym-Green conjecture for torsion line bundles of high order, Duke Math. J. **166** (2017), no. 6, 1103–1124.
- [42] Ofer Gabber, Qing Liu, and Dino Lorenzini, Hypersurfaces in projective schemes and a moving lemma, Duke Math. J. **164** (2015), no. 7, 1187–1270.
- [43] Mark L. Green, Koszul cohomology and the geometry of projective varieties, J. Differential Geom. 19 (1984), no. 1, 125–171.
- [44] _____, Koszul cohomology and the geometry of projective varieties. II, J. Differential Geom. **20** (1984), no. 1, 279–289.

- [45] Mark Green, Restrictions of linear series to hyperplanes, and some results of Macaulay and Gotzmann, Algebraic curves and projective geometry (Trento, 1988), Lecture Notes in Math., vol. 1389, Springer, Berlin, 1989, pp. 76–86.
- [46] Gerd Gotzmann, Eine Bedingung für die Flachheit und das Hilbertpolynom eines graduierten Ringes, Math. Z. 158 (1978), no. 1, 61–70 (German).
- [47] Mark Haiman and Bernd Sturmfels, Multigraded Hilbert schemes, J. Algebraic Geom. 13 (2004), no. 4, 725–769.
- [48] Robin Hartshorne, Connectedness of the Hilbert scheme, Inst. Hautes Études Sci. Publ. Math. **29** (1966), 5–48.
- [49] Milena Hering and Diane Maclagan, The T-graph of a multigraded Hilbert scheme, Exp. Math. 21 (2012), no. 3, 280–297.
- [50] Roser Homs, Joachim Jelisiejew, Mateusz Michałek, and Tim Seynnaeve, Bounds on complexity of matrix multiplication away from Coppersmith-Winograd tensors, J. Pure Appl. Algebra 226 (2022), no. 12, Paper No. 107142, 16.
- [51] Heather A. Hulett, Maximum Betti numbers of homogeneous ideals with a given Hilbert function, Comm. Algebra 21 (1993), no. 7, 2335–2350.
- [52] A. Iarrobino, Reducibility of the families of 0-dimensional schemes on a variety, Invent. Math. 15 (1972), 72–77.
- [53] Joachim Jelisiejew, Pathologies on the Hilbert scheme of points, Invent. Math. **220** (2020), no. 2, 581–610.
- [54] Michael Kemeny, Universal secant bundles and syzygies of canonical curves, Invent. Math. 223 (2021), no. 3, 995–1026.
- [55] Vijay Kodiyalam, Asymptotic behaviour of Castelnuovo-Mumford regularity, Proc. Amer. Math. Soc. 128 (2000), no. 2, 407–411.
- [56] Alex Küronya, Victor Lozovanu, and Catriona Maclean, Convex bodies appearing as Okounkov bodies of divisors, Adv. Math. 229 (2012), no. 5, 2622–2639.
- [57] Aaron Landesman, Peter Ruhm, and Robin Zhang, Spin canonical rings of log stacky curves, Ann. Inst. Fourier (Grenoble) 66 (2016), no. 6 (English, with English and French summaries).
- [58] Robert Lazarsfeld, Giuseppe Pareschi, and Mihnea Popa, Local positivity, multiplier ideals, and syzygies of abelian varieties, Algebra Number Theory 5 (2011), no. 2, 185–196.
- [59] Alexander Lemmens, On the n-th row of the graded Betti table of an n-dimensional toric variety, J. Algebraic Combin. 47 (2018), no. 4, 561–584.
- [60] Daniel R. Grayson and Michael E. Stillman, Macaulay 2, a software system for research in algebraic geometry. Available at http://www.math.uiuc.edu/Macaulay2/.
- [61] F. S. MacAulay, Some Properties of Enumeration in the Theory of Modular Systems, Proc. London Math. Soc. (2) **26** (1927), 531–555.
- [62] Diane Maclagan and Gregory G. Smith, Smooth and irreducible multigraded Hilbert schemes, Adv. Math. 223 (2010), no. 5, 1608–1631.
- [63] ______, Uniform bounds on multigraded regularity, J. Algebraic Geom. 14 (2005), no. 1, 137–164.
- [64] ______, Multigraded Castelnuovo-Mumford regularity, J. Reine Angew. Math. **571** (2004), 179–212.
- [65] D. Maclagan and R. R. Thomas, *Combinatorics of the toric Hilbert scheme*, Discrete Comput. Geom. **27** (2002), no. 2, 249–272.
- [66] Ezra Miller and Bernd Sturmfels, *Combinatorial commutative algebra*, Graduate Texts in Mathematics, vol. 227, Springer-Verlag, New York, 2005.
- [67] David Mumford, Further pathologies in algebraic geometry, Amer. J. Math. 84 (1962), 642–648.
- [68] ______, Varieties defined by quadratic equations, Questions on Algebraic Varieties (C.I.M.E., III Ciclo, Varenna, 1969), Edizioni Cremonese, Rome, 1970, pp. 29–100.

- [69] D. Mumford, On the equations defining abelian varieties. I, Invent. Math. 1 (1966), 287–354.
- [70] Giorgio Ottaviani and Raffaella Paoletti, Syzygies of Veronese embeddings, Compositio Math. 125 (2001), no. 1, 31–37.
- [71] Keith Pardue, Deformation classes of graded modules and maximal Betti numbers, Illinois J. Math. 40 (1996), no. 4, 564–585.
- [72] Giuseppe Pareschi, Syzygies of abelian varieties, J. Amer. Math. Soc. 13 (2000), no. 3, 651–664.
- [73] Giuseppe Pareschi and Mihnea Popa, Regularity on abelian varieties. I, J. Amer. Math. Soc. 16 (2003), no. 2, 285–302.
- [74] _____, Regularity on abelian varieties. II. Basic results on linear series and defining equations, J. Algebraic Geom. 13 (2004), no. 1, 167–193.
- [75] Irena Peeva and Mike Stillman, *Toric Hilbert schemes*, Duke Math. J. **111** (2002), no. 3, 419–449.
- [76] Bjorn Poonen, Bertini theorems over finite fields, Ann. of Math. (2) 160 (2004), no. 3, 1099–1127.
- [77] Ritvik Ramkumar and Alessio Sammartano, On the smoothness of lexicographic points on Hilbert schemes, J. Pure Appl. Algebra 226 (2022), no. 3, Paper No. 106872, 12.
- [78] _____, On the smoothness of lexicographic points on Hilbert schemes, J. Pure Appl. Algebra **226** (2022), no. 3, Paper No. 106872, 12.
- [79] Francisco Santos, Non-connected toric Hilbert schemes, Math. Ann. 332 (2005), no. 3, 645–665.
- [80] Frank-Olaf Schreyer, Syzygies of canonical curves and special linear series, Math. Ann. 275 (1986), no. 1, 105–137.
- [81] ______, A standard basis approach to syzygies of canonical curves, J. Reine Angew. Math. **421** (1991), 83–123.
- [82] Roy Skjelnes and Gregory G. Smith, Smooth Hilbert schemes: their classification and geometry, Journal für die reine und angewandte Mathematik (Crelle's Journal).. to appear.
- [83] Karen E. Smith and Irena Swanson, *Linear bounds on growth of associated primes*, Comm. Algebra **25** (1997), no. 10, 3071–3079.
- [84] Irena Swanson, Powers of ideals: primary decompositions, Artin-Rees lemma and regularity, Math. Ann. **307** (1997), no. 2, 299–313.
- [85] Ravi Vakil, Murphy's law in algebraic geometry: badly-behaved deformation spaces, Invent. Math. 164 (2006), no. 3, 569–590.
- [86] John Voight and David Zureick-Brown, *The canonical ring of a stacky curve*, Mem. Amer. Math. Soc. **277** (2022), no. 1362, v+144.
- [87] Claire Voisin, Green's generic syzygy conjecture for curves of even genus lying on a K3 surface, J. Eur. Math. Soc. (JEMS) 4 (2002), no. 4, 363–404.
- [88] _____, Green's canonical syzygy conjecture for generic curves of odd genus, Compos. Math. 141 (2005), no. 5, 1163–1190.