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1. [arXiv:2308.03568](#) [[pdf](#), [ps](#), [other](#)] [math-ph](#) [math.AG](#) [nlin.SI](#)

### Mapping partition functions

**Authors:** [Di Yang](#), [Don Zagier](#)

**Abstract:** We introduce an infinite group action on partition functions of WK type, meaning of the type of the partition function  $Z^{WK}$  in the famous result of Witten and Kontsevich expressing the partition function of  $\psi$ -class integrals on the compactified moduli space  $\overline{M}_{g, n}$  as a  $\tau$ -function for the Korteweg--de Vries hierarchy. Specifically, the group which acts is the gro... [v More](#)

**Submitted** 7 August, 2023; **originally announced** August 2023.

**Comments:** 72 pages

2. [arXiv:2304.12545](#) [[pdf](#), [other](#)] [math.GT](#) [hep-th](#)

### Hyperbolic 3-manifolds, the Bloch group, and the work of Walter Neumann

**Authors:** [Stavros Garoufalidis](#), [Don Zagier](#)

**Abstract:** This is an article about the work of Walter Neumann on hyperbolic geometry, ideal triangulations of 3-manifolds, the volume and Chern-Simons invariants of 3-manifolds and their elements of the the Bloch group. The article focuses on the relations of these classical invariants and the impact of Neumann's work to quantum topology and to mathematical physics.

**Submitted** 24 April, 2023; **originally announced** April 2023.

**Comments:** 19 pages

3. [arXiv:2304.09377](#) [[pdf](#), [other](#)] [math.GT](#) [hep-th](#) [doi](#) [10.3842/SIGMA.2023.082](#)

### Knots and Their Related $q$ -Series

**Authors:** [Stavros Garoufalidis](#), [Don Zagier](#)

**Abstract:** We discuss a matrix of periodic holomorphic functions in the upper and lower half-plane which can be obtained from a factorization of an Andersen-Kashaev state integral of a knot complement with remarkable analytic and asymptotic properties that defines a  $\mathrm{PSL}_2(\mathbb{Z})$ -cocycle on the space of matrix-valued piecewise analytic functions on the real numbers. We identify the corresponding... [v More](#)

**Submitted** 1 November, 2023; **v1** submitted 18 April, 2023; **originally announced** April 2023.

**Journal ref:** SIGMA 19 (2023), 082, 39 pages

4. [arXiv:2210.10686](#) [[pdf](#), [ps](#), [other](#)] [math.NT](#) [math-ph](#)

### Modular Linear Differential Operators and Generalized Rankin-Cohen Brackets

**Authors:** [Kiyokazu Nagatomo](#), [Yuichi Sakai](#), [Don Zagier](#)

**Abstract:** The aim in this paper is to give expressions for modular linear differential operators of any order. In particular, we show that they can all be described in terms of Rankin-Cohen brackets and a modified Rankin-Cohen bracket found by Kaneko and Koike. We also give more uniform descriptions of MLDOs in terms of canonically defined higher Serre derivatives and an extension of Rankin-Cohen brackets,... [v More](#)

**Submitted** 19 October, 2022; **originally announced** October 2022.

**Report number:** MPIM-Bonn-2022

5. [arXiv:2203.09426](#) [[pdf](#), [ps](#), [other](#)] [hep-th](#) [math.AG](#) [math.NT](#)

### D-brane masses at special fibres of hypergeometric families of Calabi-Yau threefolds, modular forms, and periods

**Authors:** [Kilian Bönisch](#), [Albrecht Klemm](#), [Emanuel Scheidegger](#), [Don Zagier](#)

**Abstract:** We consider the fourteen families  $W$  of Calabi-Yau threefolds with one complex structure parameter and Picard-Fuchs equation of hypergeometric type, like the mirror of the quintic in  $\mathbb{P}^4$ . Mirror symmetry identifies the masses of even-dimensional D-branes of the mirror Calabi-Yau  $M$  with four periods of the holomorphic  $(3, 0)$ -form over a symplectic basis of  $H_3(W, \mathbb{Z})$ . It w... [▽ More](#)

**Submitted** 17 March, 2022; **originally announced** March 2022.

**Comments:** 78 pages

**Report number:** BONN-TH-2022-07

6. [arXiv:2203.06519](#) [[pdf](#), [other](#)] [math-ph](#) [hep-th](#) [math.AG](#) [math.DS](#) [math.NT](#)

### A hyperbolic Kac-Moody Calogero model

**Authors:** [Olaf Lechtenfeld](#), [Don Zagier](#)

**Abstract:** A new kind of quantum Calogero model is proposed, based on a hyperbolic Kac-Moody algebra. We formulate nonrelativistic quantum mechanics on the Minkowskian root space of the simplest rank-3 hyperbolic Lie algebra  $AE_3$  with an inverse-square potential given by its real roots and reduce it to the unit future hyperboloid. By stereographic projection this defines a quantum mechanics on the Poincaré... [▽ More](#)

**Submitted** 14 August, 2023; **v1** submitted 12 March, 2022; **originally announced** March 2022.

**Comments:** 1+26 pages, numerous figures; v2: omission in eq.(3.2) corrected

7. [arXiv:2111.06645](#) [[pdf](#), [other](#)] [math.GT](#) [hep-th](#)

### Knots, perturbative series and quantum modularity

**Authors:** [Stavros Garoufalidis](#), [Don Zagier](#)

**Abstract:** We introduce an invariant of a hyperbolic knot which is a map  $\alpha \mapsto \mathbf{\Phi}_\alpha(h)$  from  $Q/Z$  to matrices with entries in  $\mathbb{Q}[[h]]$  and with rows and columns indexed by the boundary parabolic  $SL_2(\mathbb{C})$  representations of the fundamental group of the knot. These matrix invariants have a rich structure: (a) their  $(\sigma_0, \sigma_1)$  entry, where  $\sigma_j$  i... [▽ More](#)

**Submitted** 23 April, 2023; **v1** submitted 12 November, 2021; **originally announced** November 2021.

**Comments:** 97 pages, 8 figures. Updated sequences of universal denominators and universal connected denominators

8. [arXiv:2101.10924](#) [[pdf](#), [other](#)] [math.AG](#) [math-ph](#) [math.DG](#) [nlin.SI](#)

### Geometry and arithmetic of integrable hierarchies of KdV type. I. Integrality

**Authors:** [Boris Dubrovin](#), [Di Yang](#), [Don Zagier](#)

**Abstract:** For each of the simple Lie algebras  $\mathfrak{g} = A_l, D_l$  or  $E_6$  we show that the all-genera one-point FJRW invariants of  $\mathfrak{g}$ -type, after multiplication by suitable products of Pochhammer symbols, are the coefficients of an algebraic generating function and hence are integral. Moreover, we find that the all-genera invariants themselves coincide with the coefficients of the unique... [▽ More](#)

**Submitted** 5 July, 2022; **v1** submitted 26 January, 2021; **originally announced** January 2021.

**Comments:** v2: added a note and several footnotes specifying the role of the deceased first author in this collaborative research, corrected typos, and added or updated a few references. 56 pages

9. [arXiv:2101.02187](#) [[pdf](#), [ps](#), [other](#)] [math.CO](#) [math.AG](#)

### A curious identity that implies Faber's conjecture

**Authors:** [Elba Garcia-Failde](#), [Don Zagier](#)

**Abstract:** We prove that a curious generating series identity implies Faber's intersection number conjecture (by showing that it implies a combinatorial identity already given in [arXiv:1902.02742](#)) and give a new proof of Faber's conjecture by directly proving this identity.

**Submitted** 22 April, 2021; **v1** submitted 6 January, 2021; **originally announced** January 2021.

**Comments:** 4 pages (in v2: minor improvements)

**MSC Class:** 05E14; 14H10; 14N10

10. [arXiv:2012.15805](#) [[pdf](#), [other](#)] [math.NT](#)

### Arithmetic properties of the Herglotz function

**Authors:** [Danylo Radchenko](#), [Don Zagier](#)

**Abstract:** In this paper we study two functions  $F(x)$  and  $J(x)$ , originally found by Herglotz in 1923 and later rediscovered and used by one of the authors in connection with the Kronecker limit formula for real quadratic fields. We discuss many interesting properties of these functions, including special values at rational or quadratic irrational arguments as rational linear combinations of dilogarithms a... [▽ More](#)

**Submitted** 31 December, 2020; **originally announced** December 2020.

**Comments:** 18 pages

11. [arXiv:2011.02187](#) [[pdf](#), [ps](#), [other](#)] [math.CA](#) [math.AP](#)

### Strichartz Estimates with Broken Symmetries

**Authors:** [Felipe Gonçalves](#), [Don Zagier](#)

**Abstract:** In this note we study the eigenvalue problem for a quadratic form associated with Strichartz estimates for the Schrödinger equation, proving in particular a sharp Strichartz inequality for the case of odd initial data. We also describe an alternative method that is applicable to a wider class of matrix problems.

**Submitted** 5 February, 2022; **v1** submitted 4 November, 2020; **originally announced** November 2020.

**Comments:** 11 pages; 1 figure

**MSC Class:** 42B37; 41A44; 33C45

12. [arXiv:2010.16367](#) [[pdf](#), [other](#)] [math.GT](#) [math.AG](#) [math.DG](#)

**Nu-invariants of extra-twisted connected sums****Authors:** [Sebastian Goette](#), [Johannes Nordström](#), [Don Zagier](#)**Abstract:** We analyse the possible ways of gluing twisted products of circles with asymptotically cylindrical Calabi-Yau manifolds to produce manifolds with holonomy  $G_2$ , thus generalising the twisted connected sum construction of Kovalev and Corti, Haskins, Nordström, Pacini. We then express the extended nu-invariant of Crowley, Goette, and Nordström in terms of fixpoint and gluing contributions, which incl... [▽ More](#)**Submitted** 30 October, 2020; **originally announced** October 2020.**Comments:** 68 pages; appendix by Don Zagier**MSC Class:** 57R20 (Primary) 53C29; 58J28; 11F20 (Secondary)13. [arXiv:1907.00188](#) [[pdf](#), [ps](#), [other](#)] math.NT**Theta Blocks****Authors:** [Valery Gritsenko](#), [Nils-Peter Skoruppa](#), [Don Zagier](#)**Abstract:** We define theta blocks as products of Jacobi theta functions divided by powers of the Dedekind eta-function and show that they give a powerful new method to construct Jacobi forms and Siegel modular forms, with applications also in lattice theory and algebraic geometry. One of the central questions is when a theta block defines a Jacobi form. It turns out that this seemingly simple question is con... [▽ More](#)**Submitted** 29 June, 2019; **originally announced** July 2019.**MSC Class:** 11F5014. [arXiv:1906.12339](#) [[pdf](#), [ps](#), [other](#)] math.NT hep-th math-ph**Genus-zero and genus-one string amplitudes and special multiple zeta values****Authors:** [Don Zagier](#), [Federico Zerbini](#)**Abstract:** In this paper we show that in perturbative string theory the genus-one contribution to formal 2-point amplitudes can be related to the genus-zero contribution to 4-point amplitudes. This is achieved by studying special linear combinations of multiple zeta values that appear as coefficients of the amplitudes. We also exploit our results to relate closed strings to open strings at genus one using Br... [▽ More](#)**Submitted** 29 April, 2020; **v1** submitted 28 June, 2019; **originally announced** June 2019.**Comments:** V2: minor typos corrected, 24 pages, essentially coincides with published version**Journal ref:** Commun. Number Theory Phys. Vol. 14 (2020), no. 2, 413--45215. [arXiv:1906.01067](#) [[pdf](#), [other](#)] math.DS math.NT math.SP**Dynamics of geodesics, and Maass cusp forms****Authors:** [A. Pohl](#), [D. Zagier](#)**Abstract:** The correspondence principle in physics between quantum mechanics and classical mechanics suggests deep relations between spectral and geometric entities of Riemannian manifolds. We survey---in a way intended to be accessible to a wide audience of mathematicians---a mathematically rigorous instance of such a relation that emerged in recent years, showing a dynamical interpretation of certain Lapla... [▽ More](#)**Submitted** 19 November, 2020; **v1** submitted 3 June, 2019; **originally announced** June 2019.**Comments:** 30 pages, 17 figures**MSC Class:** 11F37; 11F67; 37D40; 37D35; 37B1016. [arXiv:1906.00071](#) [[pdf](#), [ps](#), [other](#)] math.AG hep-th doi [10.1016/j.geomphys.2019.06.006](#)**Dimensional interpolation and the Selberg integral****Authors:** [V. Golyshev](#), [D. van Straten](#), [D. Zagier](#)**Abstract:** We show that a version of dimensional interpolation for the Riemann--Roch--Hirzebruch formalism in the case of a grassmannian leads to an expression for the Euler characteristic of line bundles in terms of a Selberg integral. We propose a way to interpolate higher Bessel equations, their wedge powers, and monodromies thereof to non--integer orders, and link the result with the dimensional interpol... [▽ More](#)**Submitted** 4 June, 2019; **v1** submitted 31 May, 2019; **originally announced** June 2019.17. [arXiv:1903.09470](#) [[pdf](#), [other](#)] math.NT**Cotangent sums, quantum modular forms, and the generalized Riemann hypothesis****Authors:** [John Lewis](#), [Don Zagier](#)**Abstract:** We show that an asymptotic property of the determinants of certain matrices whose entries are finite sums of cotangents with rational arguments is equivalent to the GRH for odd Dirichlet characters. This is then connected to the existence of certain quantum modular forms related to Maass Eisenstein series.**Submitted** 22 March, 2019; **originally announced** March 2019.**Comments:** 24 pages, 8 figures18. [arXiv:1902.07321](#) [[pdf](#), [ps](#), [other](#)] math.NT doi [10.1073/pnas.1902572116](#)**Jensen polynomials for the Riemann zeta function and other sequences****Authors:** [Michael Griffin](#), [Ken Ono](#), [Larry Rolen](#), [Don Zagier](#)**Abstract:** In 1927 Pólya proved that the Riemann Hypothesis is equivalent to the hyperbolicity of Jensen polynomials for the Riemann zeta function  $\zeta(s)$  at its point of symmetry. This hyperbolicity has been proved for degrees  $d \leq 3$ . We obtain an asymptotic formula for the central derivatives  $\zeta^{(2n)}(1/2)$  that is accurate to all orders, which allows us to prove the hyperbolicity of a density 1 subse... [▽ More](#)**Submitted** 31 March, 2019; **v1** submitted 19 February, 2019; **originally announced** February 2019.**Comments:** 11 pages

19. [arXiv:1901.01785](#) [[pdf](#), [ps](#), [other](#)] math.AG math.GT math.NT doi [10.1007/s00222-020-00969-4](#)  
**Masur-Veech volumes and intersection theory on moduli spaces of abelian differentials**  
**Authors:** Dawei Chen, Martin Möller, Adrien Sauvaget, Don Zagier  
**Abstract:** We show that the Masur-Veech volumes and area Siegel-Veech constants can be obtained by intersection numbers on the strata of Abelian differentials with prescribed orders of zeros. As applications, we evaluate their large genus limits and compute the saddle connection Siegel-Veech constants for all strata. We also show that the same results hold for the spin and hyper-elliptic components of the st... [▽ More](#)  
**Submitted** 7 January, 2019; **originally announced** January 2019.  
**Comments:** 67 pages, 3 figures
20. [arXiv:1812.07690](#) [[pdf](#), [other](#)] math.GT hep-th  
**Asymptotics of Nahm sums at roots of unity**  
**Authors:** Stavros Garoufalidis, Don Zagier  
**Abstract:** We give a formula for the radial asymptotics to all orders of the special  $q$ -hypergeometric series known as Nahm sums at complex roots of unity. This result is used in [\[CGZ\]](#) to prove one direction of Nahm's conjecture relating the modularity of Nahm sums to the vanishing of a certain invariant in  $K$ -theory. The power series occurring in our asymptotic formula are identical to the conjecture... [▽ More](#)  
**Submitted** 18 December, 2018; **originally announced** December 2018.  
**Comments:** 17 pages
21. [arXiv:1802.00711](#) [[pdf](#), [ps](#), [other](#)] math.AG math-ph  
**Gromov--Witten invariants of the Riemann sphere**  
**Authors:** Boris Dubrovin, Di Yang, Don Zagier  
**Abstract:** A conjectural formula for the  $k$ -point generating function of Gromov--Witten invariants of the Riemann sphere for all genera and all degrees was proposed in [\[DY2\]](#). In this paper, we give a proof of this formula together with an explicit analytic (as opposed to formal) expression for the corresponding matrix resolvent. We also give a formula for the  $k$ -point function as a sum of  $(k-1)!$  pro... [▽ More](#)  
**Submitted** 2 February, 2018; **originally announced** February 2018.  
**Comments:** 23 pages
22. [arXiv:1712.04887](#) [[pdf](#), [other](#)] math.NT hep-th math.GT  
**Bloch groups, algebraic K-theory, units, and Nahm's Conjecture**  
**Authors:** Frank Calegari, Stavros Garoufalidis, Don Zagier  
**Abstract:** Given an element of the Bloch group of a number field  $\sim F$  and a natural number  $\sim n$ , we construct an explicit unit in the field  $F_n = F(e^{2\pi i/n})$ , well-defined up to  $\sim n$ -th powers of nonzero elements of  $\sim F_n$ . The construction uses the cyclic quantum dilogarithm, and under the identification of the Bloch group of  $\sim F$  with the  $K$ -group  $K_3(F)$  gives [\[changed\]{\(up to an unidentified invertible s... \[▽ More\]\(#\)](#)  
**Submitted** 5 April, 2021; **v1** submitted 13 December, 2017; **originally announced** December 2017.  
**Comments:** Several minor inaccuracies have been corrected and the exposition has been improved at several points. The motivational section on quantum topology has been shortened and moved to the introduction. The new version also contains a more careful treatment of the prime 3 (where versions of the Bloch group in the literature differ), permitting us to improve the statements of several of our results
23. [arXiv:1711.00327](#) [[pdf](#), [ps](#), [other](#)] math.NT doi [10.1515/crelle-2018-0035](#)  
**A simple proof of the Eichler-Selberg trace formula**  
**Authors:** Alexandru A. Popa, Don Zagier  
**Abstract:** We give a short proof of the trace formula for Hecke operators on modular forms for the modular group, using the action of Hecke operators on the space of period polynomials.  
**Submitted** 18 December, 2018; **v1** submitted 1 November, 2017; **originally announced** November 2017.  
**Comments:** 14 pages. Final version, to appear in J. Reine Angew. Math  
**MSC Class:** 11F11; 11F25; 11F67
24. [arXiv:1706.07885](#) [[pdf](#), [ps](#), [other](#)] math.NT  
**Periods of modular forms on  $\Gamma_0(N)$  and products of Jacobi theta functions**  
**Authors:** Y. Choie, Y. Park, D. Zagier  
**Abstract:** Generalizing a result of [\[Z1991\]](#) for modular forms of level  $\sim one$ , we give a closed formula for the sum of all Hecke eigenforms on  $\Gamma_0(N)$ , multiplied by their odd period polynomials in two variables, as a single product of Jacobi theta series for any squarefree level  $N$ . We also show that for  $N = 2, \sim 3$  and  $\sim 5$  this formula completely determines the Fourier expansions of all Hecke eigenforms of... [▽ More](#)  
**Submitted** 23 June, 2017; **originally announced** June 2017.  
**Report number:** NRF-2017R1A2B2001807, NRF-2016R1A2B1012330, NRF-2017R1D1A1B03029519, NRF-2009-009382 **MSC Class:** Primary 11F67; 11F12; 11F25; Secondary 11F50
25. [arXiv:1606.04065](#) [[pdf](#), [ps](#), [other](#)] math.NT math.AG math.CO math.GT  
**Quasimodularity and large genus limits of Siegel-Veech constants**  
**Authors:** Dawei Chen, Martin Moeller, Don Zagier  
**Abstract:** Quasimodular forms were first studied in the context of counting torus coverings. Here we show that a weighted version of these coverings with Siegel-Veech weights also provides quasimodular forms. We apply this to prove conjectures of Eskin and Zorich on the large genus limits of Masur-Veech volumes and of Siegel-Veech constants. In Part I we connect the geometric definition of Siegel-Veech con... [▽ More](#)  
**Submitted** 27 March, 2018; **v1** submitted 13 June, 2016; **originally announced** June 2016.

**Comments:** 107 pages, final version, to appear in J. of the AMS

26. [arXiv:1604.02822](#) [[pdf](#), [ps](#), [other](#)] math.NT

### A combinatorial refinement of the Kronecker-Hurwitz class number relation

**Authors:** Alexandru A. Popa, Don Zagier

**Abstract:** We give a refinement of the Kronecker-Hurwitz class number relation, based on a tessellation of the Euclidean plane into semi-infinite triangles labeled by  $PSL_2(\mathbb{Z})$  that may be of independent interest.

**Submitted** 11 April, 2016; **originally announced** April 2016.

**Comments:** 6 pages, 3 figures

**MSC Class:** 11E41

27. [arXiv:1503.05690](#) [[pdf](#), [ps](#), [other](#)] math.NT math.AG math.GT doi [10.1112/S0010437X16007636](#)

### Modular embeddings of Teichmueller curves

**Authors:** Martin Moeller, Don Zagier

**Abstract:** Fuchsian groups with a modular embedding have the richest arithmetic properties among non-arithmetic Fuchsian groups. But they are very rare, all known examples being related either to triangle groups or to Teichmueller curves. In Part I of this paper we study the arithmetic properties of the modular embedding and develop from scratch a theory of twisted modular forms for Fuchsian groups with a... [▽ More](#)

**Submitted** 4 April, 2016; **v1** submitted 19 March, 2015; **originally announced** March 2015.

**Comments:** revision including the referee's comments, to appear in Compositio Math

**Journal ref:** Compositio Math. 152 (2016) 2269-2349

28. [arXiv:1208.4074](#) [[pdf](#), [other](#)] hep-th math.NT

### Quantum Black Holes, Wall Crossing, and Mock Modular Forms

**Authors:** Atish Dabholkar, Sameer Murthy, Don Zagier

**Abstract:** We show that the meromorphic Jacobi form that counts the quarter-BPS states in N=4 string theories can be canonically decomposed as a sum of a mock Jacobi form and an Appell-Lerch sum. The quantum degeneracies of single-centered black holes are Fourier coefficients of this mock Jacobi form, while the Appell-Lerch sum captures the degeneracies of multi-centered black holes which decay upon wall-cro... [▽ More](#)

**Submitted** 3 April, 2014; **v1** submitted 20 August, 2012; **originally announced** August 2012.

**Comments:** 151 pages, 1 figure. v2: typos corrected, table added, references added

29. [arXiv:1008.1573](#) [[pdf](#), [ps](#), [other](#)] math.NT math.CO

### On a curious property of Bell numbers

**Authors:** Zhi-Wei Sun, Don Zagier

**Abstract:** In this paper we derive congruences expressing Bell numbers and derangement numbers in terms of each other modulo any prime.

**Submitted** 9 August, 2010; **originally announced** August 2010.

**Comments:** 6 pages

**MSC Class:** 11B75; 11A07; 05A15; 05A18

30. [arXiv:0903.2472](#) [[pdf](#), [ps](#), [other](#)] hep-th math.GT math.QA

### Exact Results for Perturbative Chern-Simons Theory with Complex Gauge Group

**Authors:** Tudor Dimofte, Sergei Gukov, Jonatan Lenells, Don Zagier

**Abstract:** We develop several methods that allow us to compute all-loop partition functions in perturbative Chern-Simons theory with complex gauge group  $G_{\mathbb{C}}$ , sometimes in multiple ways. In the background of a non-abelian irreducible flat connection, perturbative  $G_{\mathbb{C}}$  invariants turn out to be interesting topological invariants, which are very different from finite type (Vassiliev) invariants obtained in a t... [▽ More](#)

**Submitted** 13 March, 2009; **originally announced** March 2009.

**Comments:** 60 pages, 9 figures

**Journal ref:** Commun.Num.Theor.Phys.3:363-443,2009

31. [arXiv:0902.3113](#) [[pdf](#), [ps](#), [other](#)] math.GT gr-qc hep-ph math.QA doi [10.2140/gt.2013.17.1](#)

### Asymptotics of classical spin networks

**Authors:** Stavros Garoufalidis, Roland van der Veen, with an appendix by Don Zagier

**Abstract:** A spin network is a cubic ribbon graph labeled by representations of  $SU(2)$ . Spin networks are important in various areas of Mathematics (3-dimensional Quantum Topology), Physics (Angular Momentum, Classical and Quantum Gravity) and Chemistry (Atomic Spectroscopy). The evaluation of a spin network is an integer number. The main results of our paper are: (a) an existence theorem for the a... [▽ More](#)

**Submitted** 19 December, 2011; **v1** submitted 18 February, 2009; **originally announced** February 2009.

**Comments:** 24 pages, 32 figures

**Journal ref:** Geom. Topol. 17 (2013) 1-37

32. [arXiv:0710.0889](#) [[pdf](#), [ps](#), [other](#)] math.CO math.AG

### Some Properties of Hypergeometric Series Associated with Mirror Symmetry

**Authors:** Don Zagier, Aleksey Zinger

**Abstract:** We show that certain hypergeometric series used to formulate mirror symmetry for Calabi-Yau hypersurfaces, in string theory and algebraic geometry, satisfy a number of interesting properties. Many of these properties are used in separate papers to verify the BCOV prediction

for the genus one Gromov-Witten invariants of a quintic threefold and more generally to compute the genus one Gromov-Witten... [▽ More](#)

**Submitted** 3 October, 2007; **originally announced** October 2007.

**Comments:** 14 pages

**MSC Class:** 05A19; 14N35

33. [arXiv:math/0405040](#) [[pdf](#), [ps](#), [other](#)] math.AG math.KT math.NT doi [10.1112/S0010437X05001892](#)

### Numerical verification of Beilinson's conjecture for K2 of hyperelliptic curves

**Authors:** [Tim Dokchitser](#), [Rob de Jeu](#), [Don Zagier](#)

**Abstract:** We construct families of hyperelliptic curves over  $\mathbb{Q}$  of arbitrary genus  $g$  with (at least)  $g$  integral elements in  $K_2$ . We also verify the Beilinson conjectures about  $K_2$  numerically for several curves with  $g=2, 3, 4$  and  $5$ . The paper is essentially self-contained and may serve as an elementary introduction to Beilinson's conjectures for  $K_2$  of curves.

**Submitted** 4 May, 2005; **v1** submitted 4 May, 2004; **originally announced** May 2004.

**Comments:** 39 pages; to appear in Compositio Math

**MSC Class:** 19E08; 11G40 (primary); 11G30 (secondary)

**Journal ref:** Compositio Math. 142, Issue 02 (2006), 339-373

34. [arXiv:math-ph/0209023](#) [[pdf](#), [ps](#), [other](#)] math-ph cond-mat.dis-nn cond-mat.stat-mech hep-th math.NT math.PR doi [10.1023/A:1026012600583](#)

### Crossing Probabilities and Modular Forms

**Authors:** [Peter Kleban](#), [Don Zagier](#)

**Abstract:** We examine crossing probabilities and free energies for conformally invariant critical 2-D systems in rectangular geometries, derived via conformal field theory and Stochastic Löwner Evolution methods. These quantities are shown to exhibit interesting modular behavior, although the physical meaning of modular transformations in this context is not clear. We show that in many cases these function... [▽ More](#)

**Submitted** 27 February, 2003; **v1** submitted 12 September, 2002; **originally announced** September 2002.

**Comments:** 16 pages, AMSTeX. Minor corrections, references added

**Journal ref:** J. Stat. Phys. (2003) 113, pp. 431-454

35. [arXiv:math/0101270](#) [[pdf](#), [ps](#), [other](#)] math.NT

### Period functions for Maass wave forms. I

**Authors:** [J. Lewis](#), [D. Zagier](#)

**Abstract:** Recall that a Maass wave form on the full modular group  $\Gamma = \text{PSL}(2, \mathbb{Z})$  is a smooth  $\gamma$ -invariant function  $u$  from the upper half-plane  $H = \{x+iy \mid y>0\}$  to  $\mathbb{C}$  which is small as  $y \rightarrow \infty$  and satisfies  $\Delta u = \lambda u$  for some  $\lambda \in \mathbb{C}$ , where  $\Delta = y^2(d^2/dx^2 + d^2/dy^2)$  is the hyperbolic Laplacian. These functions give a basis for  $L_2$  on the modular surface  $\Gamma \backslash H$ , with the usual  $L_2$  norm... [▽ More](#)

**Submitted** 31 December, 2000; **originally announced** January 2001.

**Comments:** 68 pages, published version

**Report number:** Annals migration 2003

**Journal ref:** Ann. of Math. (2) 153 (2001), no. 1, 191--258

36. [arXiv:alg-geom/9612020](#) [[pdf](#), [ps](#)] math.AG

### Jacobi forms and the structure of Donaldson invariants for 4-manifolds with $b_+ = 1$

**Authors:** [Lothar Göttsche](#), [Don Zagier](#)

**Abstract:** We prove structure theorems for the Donaldson invariants of 4-manifolds with  $b_+ = 1$ , similar to those of Kronheimer and Mrowka in the case  $b_+ > 1$ : We show that for a 4-manifold with  $b_+ = 1$  and two different period points  $F, G$  on the boundary of the positive cone, the difference of the Donaldson invariants at  $F$  and  $G$  satisfies the  $k^{\text{th}}$ -order simple type condition for a number  $k$ , explicitly given... [▽ More](#)

**Submitted** 26 December, 1996; **originally announced** December 1996.

**Comments:** AMS-LaTeX, 37 pages

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### Higher Weil-Petersson Volumes of Moduli Spaces of Stable $n$ -pointed Curves

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**Abstract:** Moduli spaces of compact stable  $n$ -pointed curves carry a hierarchy of cohomology classes of top dimension which generalize the Weil-Petersson volume forms and constitute a version of Mumford classes. We give various new formulas for the integrals of these forms and their generating functions. We also discuss their relation to the Kuenneth formula in quantum cohomology.

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