ON THE COHOMOLOGY OF GL_2 AND SL_2 OVER IMAGINARY QUADRATIC FIELDS

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ABSTRACT. We report on computations of the cohomology of $\mathrm{GL}_2(\mathcal{O}_D)$ and $\mathrm{SL}_2(\mathcal{O}_D)$, where $D < 0$ is a fundamental discriminant. These computations go well beyond earlier results of Vogtmann [29] and Scheutzow [24]. We use the technique of homology of Voronoi complexes, and our computations recover the integral cohomology away from the primes $2, 3$. We observed exponential growth in the torsion subgroup of H^2 as $|D|$ increases, and compared our data to bounds of Rohlfs [22].

1. INTRODUCTION

1.1. Let F be an imaginary quadratic field of discriminant $D < 0$, let $\mathcal{O} = \mathcal{O}_D$ be its ring of integers, and let Γ be the group $\mathrm{GL}_2(\mathcal{O})$ or $\mathrm{SL}_2(\mathcal{O})$. The purpose of this paper is to computationally investigate the group cohomology of Γ. Such computations for Γ and its congruence subgroups have been investigated by many authors, cf. [3, 7, 16, 20, 21, 25, 26, 30]; of particular relevance to our results is the prior work of Vogtmann [29] and Scheutzow [24].

In this paper we significantly extend this prior work by using Voronoi's explicit reduction theory [8] to compute the integral cohomology of Γ away from the primes 2 and 3 and for a large range of discriminants. To explain what this means more precisely, for any positive integer n, let $\mathcal{S}_n$ be the *Serre class* of all finite abelian groups with orders only divisible by primes $\leq n$. For two finitely generated abelian groups A, B, we write $A \simeq_n B$ to mean that A is isomorphic to B modulo the Serre class $\mathcal{S}_n$. Then (i) it is known that the only primes dividing the orders of the finite subgroups of Γ for the groups under consideration are 2 and 3; and (ii) there is a (homologically-indexed) complex $\mathrm{Vor}_D = (V_*(\Gamma), d_*)$ of $\mathbb{Z}[\Gamma]$-modules, called the *Voronoi complex*, such that

$$H_i(V_*(\Gamma)) \simeq_3 H^{3-i}(\Gamma; \mathbb{Z}), \quad i = 1, 2, 3. \tag{1}$$

Thus our computations exhibit the integral cohomology of Γ, except possibly the torsion at 2 and 3. For more details about the construction of the complex Vor_D and the connection with group cohomology we refer to [8].

Our main experimental results and observations are as follows:

Results 1.1.

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(1) *We computed the Voronoi complex and its homology for* $\mathrm{GL}_2(\mathcal{O}_D)$ *with* $-D \leq 2099$ *and for* $\mathrm{SL}_2(\mathcal{O}_D)$ *with* $-D \leq 1247$*, and thus computed the cohomology with integral coefficients (away from the primes* $2, 3$*) for these groups.*
(2) *We understand the Betti numbers in characteristic* 0 *explicitly. In particular we see how the Eisenstein cohomology contributes. For* SL_2 *the pattern of Eisenstein cohomology agrees with the description in [29] for the Eisenstein classes in the group homology (§2.2).*
(3) *Away from the primes* 2 *and* 3*, we observe that the order of the torsion subgroup in the Voronoi homology* H_1 *is a square*[1]*. Away from* 2*, the torsion subgroup is typically the same for* GL_2 *and* SL_2*. There are however some exceptions, such as* $D = -1151$ *(since* 31 *divides the order of the torsion subgroup for* SL_2 *but not* GL_2*). Apart from such examples which account for approximately 3% of our data, the main difference lies in the order of the* 2*-torsion.*
(4) *For* GL_2 *we observe exponential growth in the order of the torsion subgroup of the Voronoi homology* H_1 *as* $|D|$ *increases (§2.3); Exponential growth for* SL_2 *is not apparent from our data. This includes not only growth in the order of the group but also the appearance of large prime factors (such as* 14116228597231 *for* $\mathrm{GL}_2(\mathcal{O}_{-2087})$*). We also noted that the torsion in the Voronoi homology group* H_2 *for either* GL_2 *or* SL_2 *is killed by* 12*.*
(5) *We compare our data to a lower bound on the dimension of the cuspidal cohomology in* H^1 *for* $\mathrm{PSL}_2(\mathcal{O})$ *due to Rohlfs [22] and observe that in many cases the bound is sharp (Figure 5 in §2.4).*
(6) *We observe surprising regularity in the linear growth of the minimal number of (infinite and finite) cyclic factors in the Voronoi homology* H_1 *for* $\mathrm{GL}_2(\mathcal{O}_D)$ *as* $|D|$ *increases (Figure 6 in §2.4).*

2. Background and structure of the cohomology

2.1. **Complex group cohomology and automorphic forms.** Throughout this subsection and the next, we consider homology and cohomology with complex coefficients.

First we consider the Voronoi homology with $\mathbb{C}$-coefficients $H_*(V_*(\Gamma)) \otimes \mathbb{C}$. We have

$$H_i(V_*(\Gamma)) \otimes \mathbb{C} \simeq H^{3-i}(\Gamma; \mathbb{C}), \quad i = 1, 2, 3.$$

It is known that the complex group cohomology $H^*(\Gamma; \mathbb{C})$ can be computed in terms of certain automorphic forms for Γ; for a general discussion of this interpretation we refer to [15, 28].

Furthermore the symmetric space $\mathfrak{H}_3$ for Γ has a partial compactification $\overline{\mathfrak{H}}_3$ due to Borel–Serre [5], which leads to a structural decomposition of the cohomology. The quotient $\Gamma\backslash\overline{\mathfrak{H}}_3$ is a compact three-dimensional orbifold with boundary (the boundary components are tori), and we have

$$H^*(\Gamma; \mathbb{C}) \simeq H^*(\Gamma\backslash\mathfrak{H}_3; \mathbb{C}) \simeq H^*(\Gamma\backslash\overline{\mathfrak{H}}_3; \mathbb{C}).$$

For a discussion about building the Borel–Serre compactification in this context, which is much simpler than the general case, we refer to Serre [27, Appendix]. More geometric examples of these compactifications can be found in Saper [23].

The inclusion of the boundary $\partial(\Gamma\backslash\overline{\mathfrak{H}}_3)$ in $\Gamma\backslash\overline{\mathfrak{H}}_3$ induces a restriction map

$$r\colon H^*(\Gamma\backslash\overline{\mathfrak{H}}_3) \to H^*(\partial(\Gamma\backslash\overline{\mathfrak{H}}_3)).$$

[1] Frank Calegari pointed out to us that a perfect pairing, called the "linking form", may explain why the order away from 2 and 3 is always a square (see [6, §3.4.1 and §5.1.2]). A related idea was communicated to us by Günter Harder.

The kernel $H^*_!$ of r is called the *interior cohomology*. There is a complement H^*_{Eis} of $H^*_!$ in $H^*(\Gamma;\mathbb{C})$ called the *Eisenstein cohomology*; its construction, which uses Eisenstein series, is due to Harder [12–14]. For the Γ under consideration, the interior cohomology can be further identified with the *cuspidal cohomology* H^*_{cusp} [10]; by definition this is part of the cohomology that corresponds to cuspidal automorphic forms in the interpretation above. Moreover, it is known that H^*_{cusp} can only be nonzero in degrees 1 and 2, and that $\dim_{\mathbb{C}} H^1_{\mathrm{cusp}} = \dim_{\mathbb{C}} H^2_{\mathrm{cusp}}$, via an isomorphism $H^1_{\mathrm{cusp}} \simeq H^2_{\mathrm{cusp}}$ induced by the Hodge $*$-operator.

To summarize, we have in degrees $i = 1, 2$ direct sum decompositions

$$H^i(\Gamma;\mathbb{C}) = H^i_{\mathrm{cusp}}(\Gamma) \oplus H^i_{\mathrm{Eis}}(\Gamma),$$

and the dimensions of H^i_{cusp} agree.

2.2. **Cuspidal classes and Eisenstein classes.** Based on our data, we observed the following, denoting the class number of $\mathcal{O}$ by h.

(1) For $\Gamma = \mathrm{GL}_2(\mathcal{O})$, we have
- $\dim H^2_{\mathrm{Eis}}(\mathrm{GL}_2(\mathcal{O})) = h - 1$, and $\dim H^1_{\mathrm{Eis}}(\mathrm{GL}_2(\mathcal{O})) = 0$. This corroborates a theorem by Harder in [12].
- $\dim H^*_{\mathrm{cusp}}(\mathrm{GL}_2(\mathcal{O}))$ can vanish for large $|D|$. Indeed, for the biggest example we worked with, namely $D = -2099$, the cuspidal cohomology vanishes.

(2) For $\Gamma = \mathrm{SL}_2(\mathcal{O})$, we have
- If $D \neq -3, -4$, then $\dim H^2_{\mathrm{Eis}}(\mathrm{SL}_2(\mathcal{O})) = h - 1$, and $\dim H^1_{\mathrm{Eis}}(\mathrm{SL}_2(\mathcal{O})) = h$. This corroborates a theorem by Serre in [27].
- $\dim H^*_{\mathrm{cusp}}(\mathrm{SL}_2(\mathcal{O}))$ only vanishes for finitely many discriminants D. Indeed, this is a theorem of Grunewald–Schwermer [11]. Vogtmann [29] showed that the $H^1_{\mathrm{cusp}}(\mathrm{SL}_2(\mathcal{O}))$ is nonzero for only 14 discriminants, the largest being -71. This is corroborated by our computations.

Our cuspidal data agrees with Scheutzow's computations [24] for all the discriminants he treated (in particular he computed the dimension of $H^1_{\mathrm{cusp}}(\Gamma;\mathbb{Q})$ for Γ both $\mathrm{GL}_2(\mathcal{O}_D)$ and $\mathrm{SL}_2(\mathcal{O}_D)$ for all discriminants $-D \leq 260$ and $D = -643$.) We also have agreement with Vogtmann's computation of $H^1_{\mathrm{cusp}}(\mathrm{SL}_2(\mathcal{O}_D;\mathbb{Q}))$ computations, except for two discriminants: for $D = -67$, we get 2 compared to Vogtmann's 3, and for $D = -88$, we get 3 compared to Vogtmann's 2. (Vogtmann computed $H^1_{\mathrm{cusp}}(\mathrm{SL}_2(\mathcal{O}_D;\mathbb{Q}))$ for all $-D \leq 95$, and in most cases actually computed the homotopy type of $\mathrm{SL}_2(\mathcal{O}_D)\backslash\mathfrak{H}_3$. She did not address the GL_2 case, though.)

Moreover, we observe that for all $0 < -D \leq 2099$,

$$\dim H^2_{\mathrm{cusp}}(\mathrm{GL}_2(\mathcal{O})) = 0 \qquad \text{only if the ideal class group is cyclic.}$$

We have no heuristic explanation as to why this should be expected.

Figures 1 and 2 show $\dim H^2_{\mathrm{cusp}}$ as a function of $|D|$.

2.3. **Exponential growth of torsion.** We now return to integral coefficients.

It has long been known that there can be large torsion in the homology and cohomology of subgroups of $\mathrm{GL}_2(\mathcal{O})$ and $\mathrm{SL}_2(\mathcal{O})$. The first examples of this phenomenon known to us (for $\mathrm{PSL}_2(\mathcal{O}_{-4})$) appear in Elstrodt–Grunewald–Mennicke [9] and Priplata's thesis [18]. More recently Bergeron–Venkatesh [2], building on ideas of Bhargava [4], formulated a precise conjecture for the growth of the torsion in the homology of cocompact arithmetic subgroups $\Gamma \subset \mathrm{SL}_2(\mathbb{C})$ as Γ goes along a tower of subgroups of increasing index. For the case of congruence subgroups of $\mathrm{SL}_2(\mathcal{O})$—which are not cocompact—analogues of the conjecture

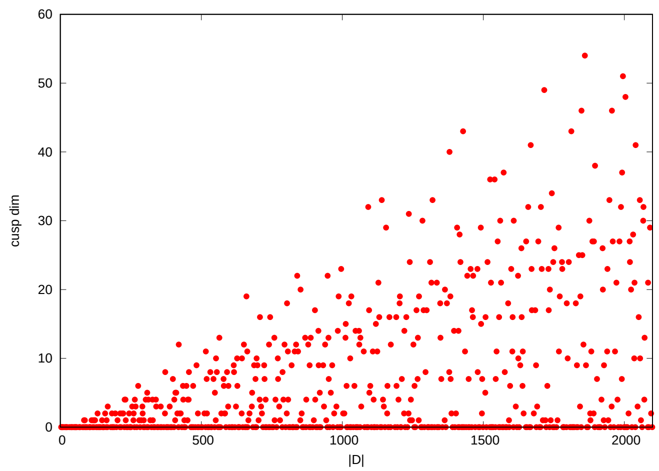

FIGURE 1. $\dim H^2_{\mathrm{cusp}}(\mathrm{GL}_2(\mathcal{O}_D))$ as a function of $|D|$.

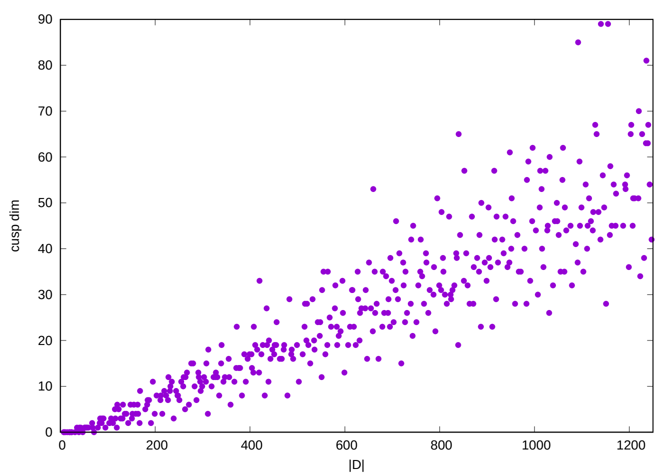

FIGURE 2. $\dim H^2_{\mathrm{cusp}}(\mathrm{SL}_2(\mathcal{O}_D))$ as a function of $|D|$.

were numerically studied by Şengün [26] and proved (for certain coefficient modules) by Pfaff [17].

Our data supports a further variation on the theme of torsion growth, namely for torsion growth in the degree 1 integral Voronoi homology of the groups $\Gamma = \mathrm{GL}_2(\mathcal{O}_D)$. In other words, instead of fixing a discriminant D and considering towers of congruence subgroups Γ

of increasing index, we work at full level and let $|D| \to \infty$. Such computations for $\mathrm{SL}_2(\mathcal{O})$ were carried out previously by Rahm [19]; he observed surprisingly large torsion primes in the first integral homology of $\mathrm{SL}_2(\mathcal{O})$, but made no conjecture about the growth. Our data here is for the 1st Voronoi homology group, which (away from 2 and 3) is isomorphic to the 2nd integral cohomology group of Γ. However, we believe that *all* the p-torsion in the Voronoi homology is arithmetically interesting, in that there should be mod p Galois representations attached to p-torsion Hecke eigenclasses for all p (not just $p > 3$). (For a discussion of this point in the context of $\mathrm{GL}_4(\mathbb{Z})$, we refer to [1].) Thus its growth behavior should be predicted by similar heuristics to [2, 4].

Figure 3 shows a plot of $\mathrm{logtor}_{\mathrm{GL}}(D) := \log |H_1(\mathrm{Vor}_*(\mathrm{GL}_2(\mathcal{O}_D)))_{\mathrm{tors}}|/|D|^2$ as a function of $|D|$. It appears from this plot that the ratio $\mathrm{logtor}_{\mathrm{GL}}(D)$ tends to a nonzero limit as $|D| \to \infty$.[2] We note that there is a large 2-torsion subgroup contributing to $\mathrm{logtor}_{\mathrm{GL}}(D)$; in fact, for the discriminants -2035, -2040 at the end of our data range, the torsion subgroup of the Voronoi homology is *all* 2-torsion. Figure 4 shows a similar plot for $\mathrm{logtor}_{\mathrm{SL}}(D)$ as a function of $|D|$, although the exponent of $|D|$ in the denominator of logtor is $3/2$, not 2.[3] For this plot, it is certainly not clear that eventually the ratio $\mathrm{logtor}_{\mathrm{SL}}(D)$ tends to a nonzero limit.

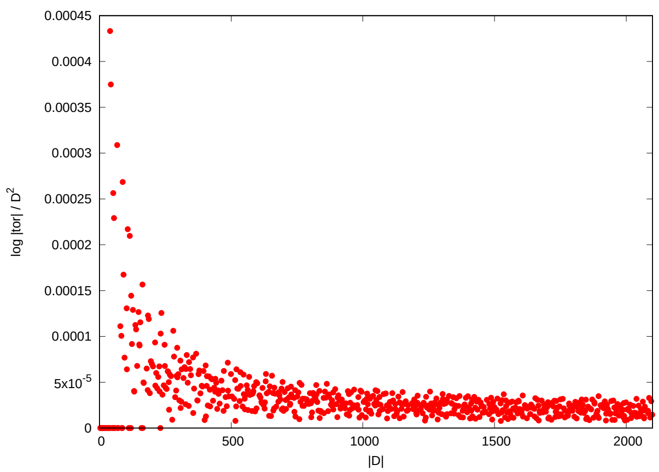

FIGURE 3. The ratio $\mathrm{logtor}_{\mathrm{GL}}(D) := \log |H_1(\mathrm{Vor}_*(\mathrm{GL}_2(\mathcal{O}_D)))_{\mathrm{tors}}|/|D|^2$ as a function of $|D|$.

2.4. **Rohlfs's bound and linear growth of cyclic factors.** In [22] Rohlfs gives a lower bound on $\dim H^1_{\mathrm{cusp}}(\Gamma)$ where $\Gamma = \mathrm{PSL}(2, \mathcal{O})$. Following an idea of Harder in [12], he

[2]More precisely, it appears that the gap between the lower envelope and the upper envelope is shrinking as one moves to the right.

[3]We believe $|D|^2$ is the appropriate factor to use in the denominator for $\Gamma = \mathrm{GL}_2(\mathcal{O}_D)$ since $H^2(\mathrm{Vor}_*(\Gamma))$ contains large amounts of 2- and 3-torsion that presumably do not contribute to $H^2(\Gamma; \mathbb{Z})_{\mathrm{tors}}$. We believe that if the correct group cohomology at 2 and 3 were used the denominator would be $|D|^{3/2}$.

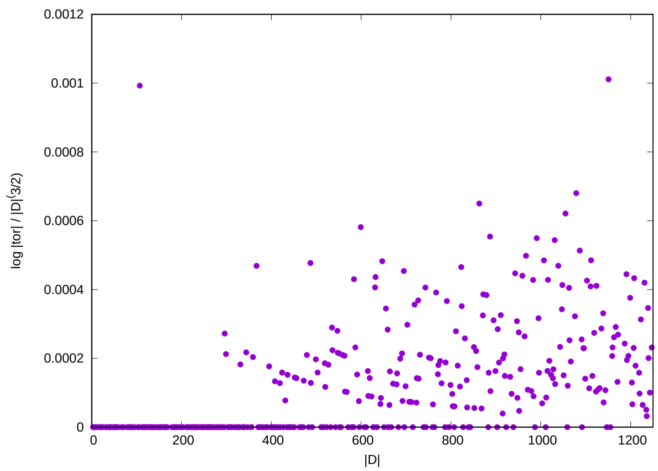

FIGURE 4. The ratio $\mathrm{logtor}_{\mathrm{SL}}(D) := \log |H_1(\mathrm{Vor}_*(\mathrm{SL}_2(\mathcal{O}_D)))_{\mathrm{tors}}|/|D|^{3/2}$ as a function of $|D|$.

uses that complex conjugation τ acts on the underlying symmetric space, hence also on the associated cohomology, giving rise to a Lefschetz fixed point formula involving the alternating traces on the groups H^j. Poincaré duality combined with the orientation-reversing property of τ allows him to isolate the contribution to the trace of H^1_{cusp}, and he subsequently bounds it by analyzing the fixed point sets of the action in detail. The main contribution to Rohlfs's bound [22, Theorem 4.2] involves Euler's totient function, which grows linearly. It turns out that if we replace PSL_2 by SL_2 and use a slightly better bound (again due to Rohlfs, cf. §4.1 in loc.cit.), we find that for $|D| \not\equiv 0 \bmod 4$ the bound is sharp in the majority (54%) of the computed cases. On the other hand the gap between the actual value and the bound for $|D| \equiv 0 \bmod 4$ appears to widen linearly with the discriminant. We show this behavior in Figure 5; the solid (resp. hollow points) correspond to $|D| \equiv$ (resp. $\not\equiv$) $0 \bmod 4$.

A surprisingly smooth slope arises when we pass to $\mathrm{GL}_2(\mathcal{O})$ and count not the rank of the cuspidal cohomology but rather the number of non-trivial cyclic factors, both finite and infinite. For finite groups, this is somtimes called the *generator rank*. In particular let $Z = Z_D$ be the number of nontrivial cyclic factors, both infinite and finite, of the first Voronoi homology. This quantity can be re-expressed as the sum of $\dim H^2(\mathrm{GL}_2(\mathcal{O})) = \dim H^2_{\mathrm{cusp}}(\mathrm{GL}_2(\mathcal{O})) + \dim H^2_{\mathrm{Eis}}(\mathrm{GL}_2(\mathcal{O}))$ plus the number of cyclic factors appearing in $H_1(\mathrm{Vor}_*(\mathrm{GL}_2(\mathcal{O})))_{\mathrm{tors}}$. Recall that $\dim H^2_{\mathrm{Eis}}(\mathrm{GL}_2(\mathcal{O}))$ is one less than the class number. Figure 6 shows a plot of this quantity as a function of $|D|$. One sees from this plot that the generator rank Z appears to be bounded below sharply by a linear function of $|D|$. We have no explanation for this phenomenon.

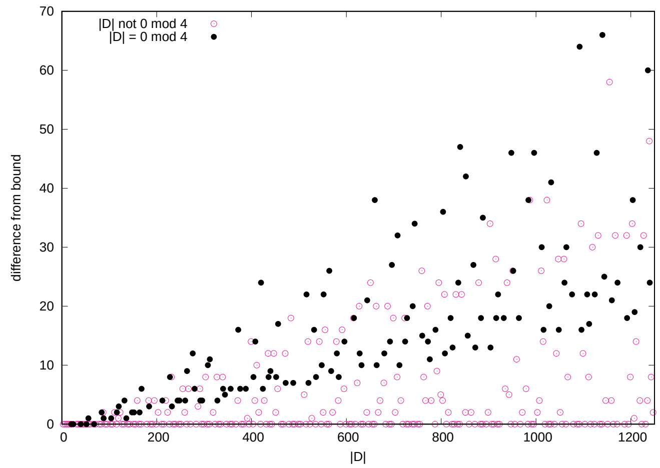

FIGURE 5. The difference between the computed dimension of $H^1_{\mathrm{cusp}}(\mathrm{SL}_2(\mathcal{O}_D); \mathbb{C})$ and Rohlfs's bound.

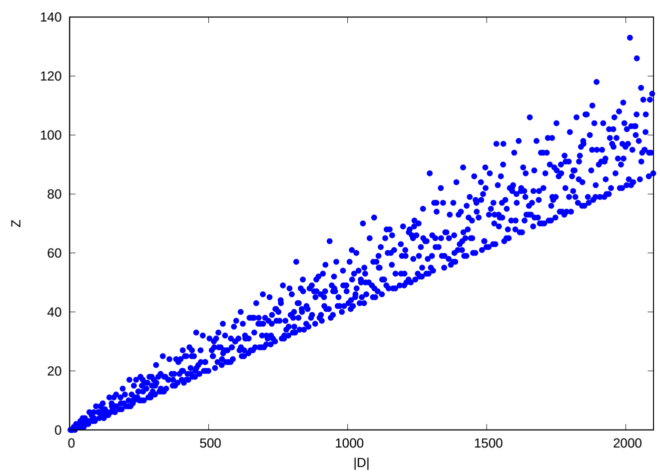

FIGURE 6. The quantity $Z = Z_D$, which is the number of nontrivial cyclic factors, both infinite and finite, of the first Voronoi homology (§2.4), plotted as a function of $|D|$.

3. Data

3.1. The remainder of the text is devoted to presenting details about the ranks and p-ranks of the homology of the Voronoi complexes in a concise form. We give data for each fundamental discriminant in two tables, the first for $\mathrm{GL}_2(\mathcal{O}_D)$ and the second for $\mathrm{SL}_2(\mathcal{O}_D)$. The notation is as follows (in this discussion Γ refers to either $\mathrm{GL}_2(\mathcal{O}_D)$ or $\mathrm{SL}_2(\mathcal{O}_D)$, depending on which table the reader is using):

- The first (boldface) entry in each table cell is the discriminant of the imaginary quadratic field $F = \mathbb{Q}(\sqrt{D})$.
- The second entry gives the cyclic factors of the class group of F. We use the notation $(d_1^{n_1}, \dots, d_k^{n_k})$ to indicate the finite abelian group
$$\prod_{i=1}^{k} (\mathbb{Z}/d_i\mathbb{Z})^{n_i}.$$
- Next we give two entries encoding the Voronoi homology group $H_1(V_*(\Gamma))$; modulo the Serre class $\mathcal{S}_3$ this is the same as the integral group cohomology $H^2(\Gamma;\mathbb{Z})$, cf. (1). In particular, this means the abelian group we describe is the integral group cohomology $H^2(\Gamma;\mathbb{Z})$ *except* for the 2- and 3-torsion.
  - The third entry is the rank of the cuspidal group, which is the same as $\dim H^2_{\mathrm{cusp}}(\Gamma;\mathbb{C})$, the dimension of the complex cohomology coming from the cuspidal automorphic forms; the full dimension of $H^2(\Gamma;\mathbb{C})$ can be obtained from this as
  $$\dim H^2(\Gamma;\mathbb{C}) = \dim H^2_{\mathrm{cusp}}(\Gamma;\mathbb{C}) + h - 1,$$
  where h is the class number of F (cf. §2.2).
  - Finally the fourth entry gives the invariant factors of the torsion subgroup of the Voronoi homology $H_1(V_*(\Gamma))$. We encode this finite abelian group using the same exponential notation for the class group. As mentioned above, away from the 2- and 3-torsion, this is the same as the torsion subgroup of $H^2(\Gamma;\mathbb{Z})$.

We omit the Voronoi homology group $H_2(V_*(\Gamma))$, which modulo the Serre class $\mathcal{S}_3$ is the same as the integral group cohomology $H^1(\Gamma;\mathbb{Z})$, since it is easily recoverable from the data for $H^2(\Gamma;\mathbb{Z})$ ((cf. §2.2)). In particular the cuspidal rank agrees with that for $H^2(\Gamma;\mathbb{C})$; for $\Gamma = \mathrm{GL}_2(\mathcal{O}_D)$ this is full rank of $H^1(\Gamma;\mathbb{Z})$, while for $\Gamma = \mathrm{SL}_2(\mathcal{O}_D)$ and $D < -4$ the full rank is the cuspidal rank plus the class number h (for the exceptional discriminants $D = -3, -4$ the rank of $H^1(\Gamma;\mathbb{Z})$ vanishes). We omit the invariant factors for $H^1(\Gamma;\mathbb{Z})$ to save space in the tables (in all cases they were annihilated by 12).

3.2. As an example, consider the GL_2 table entry for discriminant -1007. The entry appears as
$$\mathbf{-1007} \quad (30) \quad 2 \qquad (2^{24}, 534, 1602).$$
The notation (30) means the class group of $\mathcal{O}_{-1007}$ is $\mathbb{Z}/30\mathbb{Z}$, and thus $h = 30$. The next two entries are
$$2 \qquad (2^{24}, 534, 1602).$$
This means $\dim H^2_{\mathrm{cusp}}(\mathrm{GL}_2(\mathcal{O}_{-1007});\mathbb{C})$ is 2. Since $\dim H^2_{\mathrm{Eis}}(\mathrm{GL}_2(\mathcal{O}_{-1007});\mathbb{C}) = h - 1 = 29$, the full Voronoi homology group $H_1(V_*(\mathrm{GL}_2(\mathcal{O}_{-1007})))$ is isomorphic to
$$\mathbb{Z}^{31} \times (\mathbb{Z}/2\mathbb{Z})^{24} \times \mathbb{Z}/534\mathbb{Z} \times \mathbb{Z}/1602\mathbb{Z} \simeq \mathbb{Z}^{31} \times (\mathbb{Z}/2\mathbb{Z})^{26} \times (\mathbb{Z}/3\mathbb{Z})^{3} \times (\mathbb{Z}/89\mathbb{Z})^{2}. \tag{2}$$
This indicates that we have
$$H^2(\mathrm{GL}_2(\mathcal{O}_{-1007});\mathbb{Z}) \simeq_3 \mathbb{Z}^{31} \times (\mathbb{Z}/89\mathbb{Z})^2,$$

i.e. the second integral group cohomology agrees with (2) away from the 2- and 3-torsion. We note that the torsion subgroup $H^2(\mathrm{GL}_2(\mathcal{O}_{-1007}); \mathbb{Z})_{\mathrm{tors}}$ contains the large prime 89.

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4. Cohomology data for $\mathrm{GL}_2(\mathcal{O})$

D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$
−3	()	0	()	**−4**	()	0	()	**−7**	()	0	()	**−8**	()	0	()
−11	()	0	()	**−15**	(2)	0	()	**−19**	()	0	()	**−20**	(2)	0	()
−23	(3)	0	()	**−24**	(2)	0	()	**−31**	(3)	0	()	**−35**	(2)	0	()
−39	(4)	0	()	**−40**	(2)	0	(2)	**−43**	()	0	(2)	**−47**	(5)	0	()
−51	(2)	0	()	**−52**	(2)	0	(2)	**−55**	(4)	0	(2)	**−56**	(4)	0	()
−59	(3)	0	()	**−67**	()	0	(2^2)	**−68**	(4)	0	()	**−71**	(7)	0	()
−79	(5)	0	(2)	**−83**	(3)	0	(2)	**−84**	(2^2)	1	()	**−87**	(6)	1	()
−88	(2)	0	(2^3)	**−91**	(2)	0	(2^2)	**−95**	(8)	0	(2)	**−103**	(5)	0	(2^2)
−104	(6)	0	(2)	**−107**	(3)	0	$(2,6)$	**−111**	(8)	1	()	**−115**	(2)	0	(2^4)
−116	(6)	1	()	**−119**	(10)	0	()	**−120**	(2^2)	1	(2^3)	**−123**	(2)	1	(2^2)
−127	(5)	0	(2^3)	**−131**	(5)	0	(2)	**−132**	(2^2)	2	(2)	**−136**	(4)	0	(2^3)
−139	(3)	0	(2^3)	**−143**	(10)	0	(2^2)	**−148**	(2)	1	(2^4)	**−151**	(7)	0	(2^3)
−152	(6)	0	(2^3)	**−155**	(4)	0	(2^4)	**−159**	(10)	2	()	**−163**	()	0	(2^6)
−164	(8)	1	()	**−167**	(11)	0	(2^2)	**−168**	(2^2)	3	(2^2)	**−179**	(5)	0	(2^3)
−183	(8)	2	(2^2)	**−184**	(4)	0	(2^6)	**−187**	(2)	0	(2^6)	**−191**	(13)	0	(2^2)
−195	(2^2)	2	(2^4)	**−199**	(9)	0	(2^4)	**−203**	(4)	1	(2^4)	**−211**	(3)	0	(2^6)
−212	(6)	2	(2^3)	**−215**	(14)	0	(2^4)	**−219**	(4)	2	(2^3)	**−223**	(7)	2	(2^4)
−227	(5)	0	(2^5)	**−228**	(2^2)	4	(2^3)	**−231**	$(2,6)$	4	()	**−232**	(2)	1	(2^8)
−235	(2)	0	(2^{10})	**−239**	(15)	0	(2^3)	**−244**	(6)	2	(2^4)	**−247**	(6)	0	(2^8)
−248	(8)	0	(2^6)	**−251**	(7)	0	(2^4)	**−255**	$(2,6)$	3	(2^4)	**−259**	(4)	1	(2^6)
−260	$(2,4)$	2	(2^6)	**−263**	(13)	0	(2^5)	**−264**	$(2,4)$	4	(2^2)	**−267**	(2)	3	(2^6)
−271	(11)	0	(2^6)	**−276**	$(2,4)$	6	(2)	**−280**	(2^2)	1	(2^{12})	**−283**	(3)	0	(2^9)
−287	(14)	1	(2^4)	**−291**	(4)	3	(2^5)	**−292**	(4)	2	(2^7)	**−295**	(8)	0	(2^{11})
−296	(10)	1	$(2^3,4^2)$	**−299**	(8)	0	$(2^5,6)$	**−303**	(10)	4	(2^4)	**−307**	(3)	0	(2^{10})
−308	$(2,4)$	5	(2^3)	**−311**	(19)	0	(2^4)	**−312**	(2^2)	4	(2^9)	**−319**	(10)	1	(2^8)
−323	(4)	0	(2^{10})	**−327**	(12)	4	(2^4)	**−328**	(4)	1	(2^{10})	**−331**	(3)	0	$(2^{10},6)$
−335	(18)	0	(2^8)	**−339**	(6)	4	(2^4)	**−340**	(2^2)	3	(2^{12})	**−344**	(10)	0	$(2^7,4^2)$
−347	(5)	0	(2^{10})	**−355**	(4)	0	(2^{14})	**−356**	(12)	3	(2^3)	**−359**	(19)	0	$(2^4,4^2)$
−367	(9)	0	$(2^8,6^3)$	**−371**	(8)	2	(2^6)	**−372**	(2^2)	8	(2^6)	**−376**	(8)	0	(2^{12})
−379	(3)	0	(2^{13})	**−383**	(17)	0	(2^8)	**−388**	(4)	3	(2^{10})	**−391**	(14)	0	(2^{10})
−395	(8)	0	$(2^{10},4^2)$	**−399**	$(2,8)$	7	(2^2)	**−403**	(2)	0	(2^{16})	**−404**	(14)	4	(2^3)
−407	(16)	1	(2^{11})	**−408**	(2^2)	5	$(2^{11},6)$	**−411**	(6)	5	(2^6)	**−415**	(10)	2	(2^{14})
−419	(9)	0	$(2^8,6)$	**−420**	(2^3)	12	(2^6)	**−424**	(6)	2	$(2^{10},4^2)$	**−427**	(2)	2	(2^{14})

Cohomology data for $\mathrm{GL}_2(\mathcal{O})$.

D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$
$-\mathbf{431}$	(21)	0	(2^8)	$-\mathbf{435}$	(2^2)	6	(2^{12})	$-\mathbf{436}$	(6)	4	$(2^8, 4^2)$	$-\mathbf{439}$	(15)	0	(2^{11})
$-\mathbf{440}$	$(2, 6)$	1	(2^{15})	$-\mathbf{443}$	(5)	0	(2^{14})	$-\mathbf{447}$	(14)	6	(2^6)	$-\mathbf{451}$	(6)	1	(2^{12})
$-\mathbf{452}$	(8)	4	$(2^7, 4^2)$	$-\mathbf{455}$	$(2, 10)$	4	$(2^8, 4^2)$	$-\mathbf{456}$	$(2, 4)$	8	$(2^4, 4^2)$	$-\mathbf{463}$	(7)	0	(2^{16})
$-\mathbf{467}$	(7)	0	(2^{13})	$-\mathbf{471}$	(16)	6	(2^6)	$-\mathbf{472}$	(6)	0	$(2^{16}, 4^2)$	$-\mathbf{479}$	(25)	0	$(2^6, 6^2)$
$-\mathbf{483}$	(2^2)	9	(2^8)	$-\mathbf{487}$	(7)	0	$(2^{15}, 26^2)$	$-\mathbf{488}$	(10)	2	$(2^{10}, 4^2)$	$-\mathbf{491}$	(9)	0	(2^{12})
$-\mathbf{499}$	(3)	0	$(2^{16}, 6^2)$	$-\mathbf{503}$	(21)	0	$(2^{10}, 6)$	$-\mathbf{511}$	(14)	2	(2^{12})	$-\mathbf{515}$	(6)	0	(2^{20})
$-\mathbf{516}$	$(2, 6)$	11	(2^3)	$-\mathbf{519}$	(18)	7	$(2^4, 6^2)$	$-\mathbf{520}$	(2^2)	2	$(2^{21}, 4^2)$	$-\mathbf{523}$	(5)	0	(2^{17})
$-\mathbf{527}$	(18)	0	$(2^{12}, 6^2)$	$-\mathbf{532}$	(2^2)	8	(2^{12})	$-\mathbf{535}$	(14)	0	$(2^{18}, 12^2)$	$-\mathbf{536}$	(14)	0	$(2^{11}, 4^4)$
$-\mathbf{543}$	(12)	7	(2^{10})	$-\mathbf{547}$	(3)	0	$(2^{18}, 12^2)$	$-\mathbf{548}$	(8)	5	$(2^{10}, 8^2)$	$-\mathbf{551}$	(26)	1	$(2^8, 8^2)$
$-\mathbf{552}$	$(2, 4)$	10	(2^9)	$-\mathbf{555}$	(2^2)	8	(2^{16})	$-\mathbf{559}$	(16)	0	$(2^{15}, 8^2)$	$-\mathbf{563}$	(9)	0	$(2^{11}, 4^4)$
$-\mathbf{564}$	$(2, 4)$	13	$(2^5, 4^2)$	$-\mathbf{568}$	(4)	0	$(2^{22}, 4^2)$	$-\mathbf{571}$	(5)	2	(2^{17})	$-\mathbf{579}$	(8)	7	(2^9)
$-\mathbf{580}$	$(2, 4)$	6	(2^{18})	$-\mathbf{583}$	(8)	2	(2^{19})	$-\mathbf{584}$	(16)	2	$(2^7, 4^2, 12, 36)$	$-\mathbf{587}$	(7)	0	$(2^{15}, 6^3)$
$-\mathbf{591}$	(22)	8	$(2^4, 6^2)$	$-\mathbf{595}$	(2^2)	3	$(2^{23}, 6)$	$-\mathbf{596}$	(14)	6	(2^{11})	$-\mathbf{599}$	(25)	0	$(2^{11}, 142^2)$
$-\mathbf{607}$	(13)	0	(2^{19})	$-\mathbf{611}$	(10)	0	(2^{18})	$-\mathbf{615}$	$(2, 10)$	9	$(2^{10}, 4, 12)$	$-\mathbf{616}$	$(2, 4)$	8	$(2^{11}, 4^2)$
$-\mathbf{619}$	(5)	0	$(2^{19}, 6^2)$	$-\mathbf{623}$	(22)	3	$(2^{10}, 4^2)$	$-\mathbf{627}$	(2^2)	10	(2^{12})	$-\mathbf{628}$	(6)	6	(2^{16})
$-\mathbf{631}$	(13)	0	$(2^{18}, 50^2)$	$-\mathbf{632}$	(8)	0	$(2^{18}, 4^2, 8^4)$	$-\mathbf{635}$	(10)	0	(2^{22})	$-\mathbf{643}$	(3)	2	$(2^{21}, 6)$
$-\mathbf{644}$	$(2, 8)$	10	$(2^4, 4^2)$	$-\mathbf{647}$	(23)	0	$(2^{14}, 106^2)$	$-\mathbf{651}$	$(2, 4)$	12	(2^8)	$-\mathbf{655}$	(12)	0	$(2^{25}, 36^2)$
$-\mathbf{659}$	(11)	0	$(2^{15}, 22^2)$	$-\mathbf{660}$	(2^3)	19	(2^{12})	$-\mathbf{663}$	$(2, 8)$	11	$(2^{11}, 6)$	$-\mathbf{664}$	(10)	0	$(2^{20}, 4^4)$
$-\mathbf{667}$	(4)	1	(2^{24})	$-\mathbf{671}$	(30)	2	$(2^{10}, 6^2)$	$-\mathbf{679}$	(18)	3	$(2^{14}, 6^2)$	$-\mathbf{680}$	$(2, 6)$	5	$(2^{18}, 4^4)$
$-\mathbf{683}$	(5)	0	(2^{24})	$-\mathbf{687}$	(12)	9	$(2^{14}, 12^2)$	$-\mathbf{691}$	(5)	0	$(2^{22}, 14^2)$	$-\mathbf{692}$	(14)	7	$(2^{10}, 4^2)$
$-\mathbf{695}$	(24)	0	$(2^{17}, 8^6)$	$-\mathbf{696}$	$(2, 6)$	10	(2^{15})	$-\mathbf{699}$	(10)	9	$(2^8, 6^2)$	$-\mathbf{703}$	(14)	1	$(2^{22}, 8^2)$
$-\mathbf{707}$	(6)	4	$(2^{18}, 4^2)$	$-\mathbf{708}$	(2^2)	16	$(2^{11}, 4^2)$	$-\mathbf{712}$	(8)	3	$(2^{19}, 4^2)$	$-\mathbf{715}$	(2^2)	2	(2^{32})
$-\mathbf{719}$	(31)	0	$(2^{13}, 62^2)$	$-\mathbf{723}$	(4)	9	$(2^{15}, 4^2)$	$-\mathbf{724}$	(10)	7	$(2^{14}, 8^2)$	$-\mathbf{727}$	(13)	0	$(2^{22}, 74^2)$
$-\mathbf{728}$	$(2, 6)$	4	$(2^{20}, 4^4)$	$-\mathbf{731}$	(12)	0	$(2^{18}, 16^2)$	$-\mathbf{739}$	(5)	0	(2^{26})	$-\mathbf{740}$	$(2, 8)$	12	(2^{14})
$-\mathbf{743}$	(21)	0	$(2^{19}, 122^2)$	$-\mathbf{744}$	$(2, 6)$	16	(2^{10})	$-\mathbf{751}$	(15)	0	$(2^{24}, 4^2)$	$-\mathbf{755}$	(12)	0	$(2^{20}, 4^6)$
$-\mathbf{759}$	$(2, 12)$	13	(2^8)	$-\mathbf{760}$	(2^2)	1	$(2^{37}, 4^2)$	$-\mathbf{763}$	(4)	4	(2^{24})	$-\mathbf{767}$	(22)	0	$(2^{20}, 4^4, 8^4)$
$-\mathbf{771}$	(6)	10	$(2^{13}, 6^3)$	$-\mathbf{772}$	(4)	7	$(2^{18}, 4^3, 12)$	$-\mathbf{776}$	(20)	3	$(2^9, 4^6)$	$-\mathbf{779}$	(10)	1	$(2^{22}, 8^2)$
$-\mathbf{787}$	(5)	0	(2^{28})	$-\mathbf{788}$	(10)	8	$(2^{12}, 4^6)$	$-\mathbf{791}$	(32)	4	$(2^{11}, 118^2)$	$-\mathbf{795}$	(2^2)	12	(2^{24})
$-\mathbf{799}$	(16)	0	$(2^{27}, 4^4)$	$-\mathbf{803}$	(10)	2	$(2^{20}, 6^2)$	$-\mathbf{804}$	$(2, 6)$	18	$(2^7, 4^2)$	$-\mathbf{807}$	(14)	11	(2^{16})
$-\mathbf{808}$	(6)	4	$(2^{24}, 4^2)$	$-\mathbf{811}$	(7)	0	$(2^{23}, 10^4)$	$-\mathbf{815}$	(30)	0	$(2^{24}, 4^2, 8^2)$	$-\mathbf{820}$	$(2, 4)$	9	$(2^{25}, 8^2)$
$-\mathbf{823}$	(9)	0	$(2^{22}, 6^6, 18^2)$	$-\mathbf{824}$	(20)	0	$(2^{16}, 4^4, 8^4)$	$-\mathbf{827}$	(7)	0	(2^{28})	$-\mathbf{831}$	(28)	11	$(2^8, 44^2)$
$-\mathbf{835}$	(6)	0	$(2^{33}, 6^3)$	$-\mathbf{836}$	$(2, 10)$	12	$(2^7, 4^2)$	$-\mathbf{839}$	(33)	0	(2^{19})	$-\mathbf{840}$	(2^3)	22	(2^{18})
$-\mathbf{843}$	(6)	11	(2^{18})	$-\mathbf{851}$	(10)	1	$(2^{22}, 6^2, 12^2)$	$-\mathbf{852}$	$(2, 4)$	20	$(2^{13}, 4^2)$	$-\mathbf{856}$	(6)	2	$(2^{28}, 4^4, 8^2)$

Cohomology data for $\mathrm{GL}_2(\mathcal{O})$.

D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$
$\mathbf{-859}$	(7)	0	$(2^{25},6^4)$	$\mathbf{-863}$	(21)	0	$(2^{18},6^5,18^5)$	$\mathbf{-868}$	$(2,4)$	13	$(2^{16},4^2)$
$\mathbf{-871}$	(22)	0	$(2^{26},130^2)$	$\mathbf{-872}$	(10)	4	$(2^{18},4^6,12^2)$	$\mathbf{-879}$	(22)	12	$(2^{12},298^2)$
$\mathbf{-883}$	(3)	0	(2^{34})	$\mathbf{-884}$	$(2,8)$	9	$(2^{17},4^2,8^2)$	$\mathbf{-887}$	(29)	0	$(2^{19},4^2,1508^2)$
$\mathbf{-888}$	$(2,6)$	13	(2^{23})	$\mathbf{-895}$	(16)	0	$(2^{31},8^6)$	$\mathbf{-899}$	(14)	1	$(2^{20},6^4)$
$\mathbf{-903}$	$(2,8)$	17	(2^{14})	$\mathbf{-904}$	(8)	4	$(2^{20},4^6,12^2)$	$\mathbf{-907}$	(3)	0	$(2^{33},26^2)$
$\mathbf{-911}$	(31)	0	$(2^{17},4^4,44^2)$	$\mathbf{-915}$	$(2,4)$	14	$(2^{23},6)$	$\mathbf{-916}$	(10)	9	$(2^{20},4^4)$
$\mathbf{-919}$	(19)	0	$(2^{27},38^2)$	$\mathbf{-920}$	$(2,10)$	5	$(2^{28},4^2,8^2)$	$\mathbf{-923}$	(10)	0	(2^{32})
$\mathbf{-932}$	(12)	9	$(2^{15},4^6)$	$\mathbf{-935}$	$(2,14)$	3	(2^{34})	$\mathbf{-939}$	(8)	12	(2^{19})
$\mathbf{-943}$	(16)	1	$(2^{29},18^2,144^2)$	$\mathbf{-947}$	(5)	0	$(2^{33},178^2)$	$\mathbf{-948}$	$(2,6)$	22	$(2^{12},4,12)$
$\mathbf{-951}$	(26)	13	$(2^{12},114^2)$	$\mathbf{-952}$	$(2,4)$	7	$(2^{32},4^2)$	$\mathbf{-955}$	(4)	0	$(2^{40},4^2,12^2)$
$\mathbf{-959}$	(36)	5	$(2^{13},6^2,36^2)$	$\mathbf{-964}$	(12)	9	$(2^{18},4^2,52^2)$	$\mathbf{-967}$	(11)	0	$(2^{33},3574^2)$
$\mathbf{-971}$	(15)	2	$(2^{23},6^3)$	$\mathbf{-979}$	(8)	3	$(2^{28},10^2)$	$\mathbf{-983}$	(27)	0	$(2^{18},6^8,18^2)$
$\mathbf{-984}$	$(2,6)$	14	$(2^{20},4^4)$	$\mathbf{-987}$	$(2,4)$	19	(2^{16})	$\mathbf{-991}$	(17)	0	$(2^{31},10562^2)$
$\mathbf{-995}$	(8)	0	$(2^{34},4^4,12^4)$	$\mathbf{-996}$	$(2,6)$	23	$(2^{9},4^2,12^2)$	$\mathbf{-1003}$	(4)	2	$(2^{36},6^2)$
$\mathbf{-1007}$	(30)	2	$(2^{24},534,1602)$	$\mathbf{-1011}$	(12)	13	(2^{17})	$\mathbf{-1012}$	(2^2)	15	$(2^{22},4^4)$
$\mathbf{-1015}$	$(2,8)$	6	$(2^{38},28^2)$	$\mathbf{-1016}$	(16)	0	$(2^{20},4^{14},16^2)$	$\mathbf{-1019}$	(13)	0	$(2^{28},46^2)$
$\mathbf{-1023}$	$(2,8)$	18	$(2^{18},24^2)$	$\mathbf{-1027}$	(4)	0	$(2^{39},6,12^2)$	$\mathbf{-1028}$	(16)	10	$(2^{13},4^8)$
$\mathbf{-1031}$	(35)	0	$(2^{24},16210^2)$	$\mathbf{-1032}$	$(2,4)$	19	$(2^{20},4^2)$	$\mathbf{-1039}$	(23)	0	$(2^{28},10^2,1030^2)$
$\mathbf{-1043}$	(8)	6	$(2^{28},102^2)$	$\mathbf{-1047}$	(16)	14	$(2^{20},662^2)$	$\mathbf{-1048}$	(6)	0	$(2^{37},4^2,8^4,40,120)$
$\mathbf{-1051}$	(5)	0	$(2^{39},26^2)$	$\mathbf{-1055}$	(36)	0	$(2^{23},4^{10},1848^2)$	$\mathbf{-1059}$	(6)	14	(2^{24})
$\mathbf{-1060}$	$(2,4)$	12	$(2^{34},16^2)$	$\mathbf{-1063}$	(19)	0	$(2^{33},2234^2)$	$\mathbf{-1064}$	$(2,10)$	13	$(2^{10},4^6,20^2)$
$\mathbf{-1067}$	(12)	3	$(2^{30},32,96)$	$\mathbf{-1076}$	(22)	11	$(2^{12},4^4,148^2)$	$\mathbf{-1079}$	(34)	0	$(2^{30},68704^2)$
$\mathbf{-1087}$	(9)	0	$(2^{39},3806,11418)$	$\mathbf{-1091}$	(17)	0	$(2^{25},6^2,66^2)$	$\mathbf{-1092}$	(2^3)	32	(2^{18})
$\mathbf{-1095}$	$(2,14)$	17	$(2^{26},8^2)$	$\mathbf{-1096}$	(12)	5	$(2^{22},4^8,8^2)$	$\mathbf{-1099}$	(6)	6	$(2^{32},26^2)$
$\mathbf{-1103}$	(23)	0	$(2^{31},4^2,188^2)$	$\mathbf{-1108}$	(6)	11	$(2^{25},4^6)$	$\mathbf{-1111}$	(22)	4	$(2^{30},4^2,488^2)$
$\mathbf{-1112}$	(14)	0	$(2^{28},4^{12},252^2)$	$\mathbf{-1115}$	(10)	0	$(2^{42},4^2,16^2)$	$\mathbf{-1119}$	(32)	15	$(2^{14},26^2)$
$\mathbf{-1123}$	(5)	0	$(2^{40},14^2)$	$\mathbf{-1124}$	(20)	11	$(2^{15},4^4,164^2)$	$\mathbf{-1128}$	$(2,4)$	21	$(2^{17},4^6)$
$\mathbf{-1131}$	$(2,4)$	16	$(2^{26},10,30)$	$\mathbf{-1135}$	(18)	0	$(2^{44},8^2,120^2)$	$\mathbf{-1139}$	(16)	0	$(2^{30},4^2,580^2)$
$\mathbf{-1140}$	$(2^2,4)$	33	(2^{20})	$\mathbf{-1144}$	$(2,6)$	4	$(2^{39},4^6)$	$\mathbf{-1147}$	(6)	3	(2^{40})
$\mathbf{-1151}$	(41)	0	$(2^{26},24233410^2)$	$\mathbf{-1155}$	(2^3)	29	(2^{24})	$\mathbf{-1159}$	(16)	2	$(2^{37},118^2)$
$\mathbf{-1160}$	$(2,10)$	6	$(2^{37},4^2,56,168)$	$\mathbf{-1163}$	(7)	0	$(2^{40},356^2)$	$\mathbf{-1167}$	(22)	16	$(2^{22},166^2)$
$\mathbf{-1171}$	(7)	0	$(2^{40},28^2)$	$\mathbf{-1172}$	(18)	12	$(2^{20},4^2,220^2)$	$\mathbf{-1187}$	(9)	0	$(2^{39},286^2)$
$\mathbf{-1191}$	(24)	16	$(2^{22},1162^2)$	$\mathbf{-1192}$	(6)	6	$(2^{36},4^5,12)$	$\mathbf{-1195}$	(8)	0	$(2^{46},4^2,12^4)$

Cohomology data for $\mathrm{GL}_2(\mathcal{O})$.

D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$
−1199	(38)	4	$(2^{26}, 4922^2)$	**−1203**	(6)	18	$(2^{24}, 30^2)$	**−1204**	$(2,4)$	19	$(2^{23}, 4^4)$
−1207	(18)	0	$(2^{42}, 250^2)$	**−1208**	(12)	0	$(2^{32}, 4^{14}, 80, 240)$	**−1211**	(14)	7	$(2^{28}, 86^2)$
−1219	(6)	2	$(2^{42}, 58^2)$	**−1220**	$(2,8)$	14	$(2^{32}, 4^6)$	**−1223**	(35)	0	$(2^{32}, 1616^2)$
−1227	(4)	16	$(2^{29}, 8^2)$	**−1231**	(27)	0	$(2^{32}, 4^6, 272^2)$	**−1235**	$(2,6)$	2	$(2^{50}, 6^2)$
−1236	$(2,6)$	31	$(2^{14}, 4^2)$	**−1239**	$(2,16)$	24	$(2^{10}, 14^4)$	**−1240**	$(2,4)$	1	$(2^{55}, 4^6, 20^2)$
−1243	(4)	4	$(2^{40}, 6^4)$	**−1247**	(26)	1	$(2^{38}, 326^2)$	**−1252**	(8)	12	$(2^{30}, 4^2, 36, 108)$
−1255	(12)	0	$(2^{49}, 4^4, 12^4, 744^2)$	**−1256**	(26)	6	$(2^{18}, 4^8, 52^2)$	**−1259**	(15)	0	$(2^{36}, 6278^2)$
−1263	(20)	17	$(2^{24}, 14^2)$	**−1267**	(6)	7	$(2^{38}, 14^2)$	**−1268**	(10)	13	$(2^{25}, 4^6, 668^2)$
−1271	(40)	1	$(2^{31}, 6^2, 15234^2)$	**−1272**	$(2,6)$	19	$(2^{31}, 4^2, 32^2)$	**−1279**	(23)	0	$(2^{40}, 268786^2)$
−1283	(11)	0	$(2^{41}, 1294^2)$	**−1284**	$(2,10)$	30	$(2^{11}, 4^2, 12^2)$	**−1288**	$(2,4)$	17	$(2^{30}, 4^2, 8^2)$
−1291	(9)	0	$(2^{42}, 6, 18^2)$	**−1295**	$(2,18)$	8	$(2^{28}, 4^{12}, 8^2, 24^2)$	**−1299**	(8)	17	$(2^{27}, 4^2, 8^2)$
−1303	(11)	0	$(2^{47}, 4188498^2)$	**−1304**	(22)	0	$(2^{31}, 4^{10}, 28^2, 364^2)$	**−1307**	(11)	0	$(2^{42}, 2522^2)$
−1311	$(2,14)$	24	$(2^{22}, 4^2, 24^2)$	**−1315**	(6)	0	$(2^{58}, 26^2)$	**−1316**	$(2,12)$	21	$(2^{12}, 4^4, 44^2)$
−1319	(45)	0	$(2^{30}, 6, 6796710^2)$	**−1320**	(2^3)	33	$(2^{32}, 8^2)$	**−1327**	(15)	0	$(2^{41}, 6^3, 12^2, 94020^2)$
−1335	$(2,14)$	21	$(2^{32}, 26^2)$	**−1336**	(12)	0	$(2^{42}, 4^8, 8^4)$	**−1339**	(8)	0	$(2^{48}, 8^2, 152^2)$
−1343	(34)	0	$(2^{40}, 104^2, 144352^2)$	**−1347**	(6)	18	$(2^{28}, 10^4)$	**−1348**	(8)	13	$(2^{33}, 4^4, 88^2)$
−1351	(24)	7	$(2^{35}, 31766^2)$	**−1355**	(12)	0	$(2^{40}, 4^{12}, 8^2, 168, 504)$	**−1363**	(6)	1	$(2^{48}, 8^2, 40^2)$
−1364	$(2,14)$	20	$(2^{10}, 4^2, 8^4, 32, 96)$	**−1367**	(25)	0	$(2^{47}, 11964418^2)$	**−1371**	(12)	18	$(2^{25}, 12^2)$
−1379	(16)	8	$(2^{32}, 870^2)$	**−1380**	(2^3)	40	$(2^{28}, 4^2)$	**−1383**	(18)	19	$(2^{28}, 35880^2)$
−1384	(10)	7	$(2^{30}, 4^{12}, 124^2)$	**−1387**	(4)	2	$(2^{49}, 6, 1002^2)$	**−1391**	(44)	0	$(2^{33}, 8^4, 24^2, 517032^2)$
−1396	(14)	14	$(2^{26}, 4^6, 40^2)$	**−1399**	(27)	0	$(2^{45}, 94436466^2)$	**−1403**	(14)	2	$(2^{46}, 562^2)$
−1407	$(2,12)$	29	$(2^{17}, 6^5)$	**−1411**	(4)	0	$(2^{56}, 1376^2)$	**−1412**	(16)	14	$(2^{27}, 4^6, 260^2)$
−1415	(34)	0	$(2^{52}, 12^2, 37608^2)$	**−1416**	$(2,8)$	28	$(2^{14}, 4^8, 12^2)$	**−1419**	$(2,6)$	24	$(2^{22}, 42^2)$
−1423	(9)	0	$(2^{55}, 4651094^2)$	**−1427**	(15)	0	$(2^{43}, 1226, 3678)$	**−1428**	(2^3)	43	$(2^{22}, 4^4)$
−1432	(6)	0	$(2^{49}, 4^{12}, 76^2)$	**−1435**	(2^2)	11	$(2^{57}, 6)$	**−1439**	(39)	0	$(2^{39}, 96716238^2)$
−1443	$(2,4)$	22	(2^{36})	**−1447**	(23)	0	$(2^{47}, 421346^2)$	**−1448**	(18)	7	$(2^{29}, 4^9, 12, 22392, 67176)$
−1451	(13)	0	$(2^{46}, 7926^2)$	**−1455**	$(2,14)$	23	$(2^{26}, 4^8, 24^2)$	**−1459**	(11)	0	$(2^{48}, 2874^2)$
−1460	$(2,10)$	17	$(2^{38}, 12^4)$	**−1463**	$(2,16)$	16	$(2^{24}, 6^4, 858^2)$	**−1464**	$(2,6)$	22	$(2^{29}, 4^{10}, 12^2)$
−1471	(23)	0	$(2^{48}, 15948594^2)$	**−1479**	$(2,14)$	23	$(2^{30}, 6^2, 84^2)$	**−1480**	$(2,6)$	8	$(2^{45}, 4^8, 8^2, 16^4)$
−1483	(7)	0	$(2^{53}, 192^2)$	**−1487**	(37)	0	$(2^{42}, 3505609726^2)$	**−1491**	$(2,6)$	29	$(2^{22}, 14^2)$
−1492	(10)	15	$(2^{30}, 4^8, 76^2)$	**−1495**	$(2,10)$	2	$(2^{60}, 4^4, 16^2, 240^2)$	**−1496**	$(2,14)$	7	$(2^{36}, 4^{10}, 152, 456)$
−1499	(13)	0	$(2^{48}, 11702^2)$	**−1507**	(4)	5	$(2^{50}, 10^2, 30^2)$	**−1508**	$(2,8)$	16	$(2^{36}, 4^4, 284^2)$
−1511	(49)	0	$(2^{37}, 23121823034^2)$	**−1515**	$(2,6)$	24	$(2^{38}, 66^2)$	**−1523**	(7)	0	$(2^{55}, 183428^2)$

Cohomology data for $\mathrm{GL}_2(\mathcal{O})$.

D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$
−1524	$(2,10)$	36	$(2^{18},4^4)$	**−1527**	(14)	21	$(2^{34},3056^2)$
−1528	(8)	0	$(2^{52},4^{10},8^2,5032^2)$	**−1531**	(11)	0	$(2^{51},184^2)$
−1535	(38)	0	$(2^{56},8^2,3278485008^2)$	**−1540**	(2^3)	36	(2^{40})
−1543	(19)	0	$(2^{53},38544150^2)$	**−1544**	(20)	7	$(2^{25},4^{16},5276^2)$
−1547	$(2,6)$	11	$(2^{48},66^2)$	**−1551**	$(2,16)$	27	$(2^{24},4^2,8^2)$
−1555	(4)	0	$(2^{66},8^6,88^2)$	**−1556**	(22)	16	$(2^{21},4^{10},12^2,228^2)$
−1559	(51)	0	$(2^{38},940737290^2)$	**−1560**	$(2^2,4)$	30	$(2^{50},4^2)$
−1563	(6)	21	$(2^{36},6^2)$	**−1567**	(15)	0	$(2^{56},4^6,143068^2)$
−1571	(17)	0	$(2^{47},24338^2)$	**−1572**	$(2,6)$	37	$(2^{21},4^4,44^2)$
−1576	(10)	8	$(2^{33},4^{16},8^2)$	**−1579**	(9)	0	$(2^{55},6774^2)$
−1583	(33)	0	$(2^{48},70463350,211390050)$	**−1588**	(6)	18	$(2^{44},4^2,16,48)$
−1591	(22)	1	$(2^{54},20^2,40^2,221520^2)$	**−1592**	(20)	0	$(2^{40},4^{20},8808^2)$
−1595	$(2,8)$	6	$(2^{48},4^{14})$	**−1599**	$(2,18)$	23	$(2^{34},161168^2)$
−1603	(6)	11	$(2^{50},28^2)$	**−1604**	(20)	16	$(2^{22},4^{12},16012^2)$
−1607	(27)	0	$(2^{52},1189655129618^2)$	**−1608**	$(2,8)$	30	$(2^{24},4^6,40^2)$
−1615	$(2,12)$	3	$(2^{62},4^4,8^2,16^2,32^2)$	**−1619**	(15)	0	$(2^{50},6,489222^2)$
−1623	(28)	22	$(2^{30},42^2)$	**−1624**	$(2,8)$	10	$(2^{45},4^6,16^6)$
−1627	(7)	0	$(2^{59},6516^2)$	**−1631**	(44)	9	$(2^{33},6^2,31076952^2)$
−1635	$(2,4)$	26	$(2^{46},46,138)$	**−1636**	(16)	16	$(2^{28},4^{10},44^2)$
−1639	(22)	6	$(2^{48},8^2,6500848^2)$	**−1640**	$(2,8)$	11	$(2^{47},4^{10},8^2,112^2)$
−1643	(10)	2	$(2^{56},6^2,12^2,4608^2)$	**−1651**	(8)	0	$(2^{60},4^3,12,84^2)$
−1652	$(2,10)$	27	$(2^{22},4^6,140,420)$	**−1655**	(44)	0	$(2^{39},4^{16},8^6,979752^2)$
−1659	$(2,4)$	32	$(2^{32},40^2)$	**−1663**	(17)	0	$(2^{59},4533834602^2)$
−1667	(13)	0	$(2^{53},22^2,269258^2)$	**−1668**	$(2,6)$	41	$(2^{25},4^4)$
−1671	(38)	23	$(2^{20},6^6,678198^2)$	**−1672**	$(2,4)$	17	$(2^{38},4^8,80^2)$
−1679	(52)	2	$(2^{39},4^2,32^2,24185375392^2)$	**−1684**	(10)	17	$(2^{36},4^6,12^2,168^2)$
−1687	(18)	9	$(2^{50},164658^2)$	**−1688**	(10)	0	$(2^{52},4^{18},604^2)$
−1691	(18)	3	$(2^{41},6^7,2298^2)$	**−1695**	$(2,10)$	27	$(2^{40},8^6,232^2)$
−1699	(11)	0	$(2^{58},246886^2)$	**−1703**	(28)	0	$(2^{61},4^2,28^2,3237752^2)$
−1704	$(2,12)$	32	$(2^{19},4^6,44,132)$	**−1707**	(10)	23	$(2^{36},86^2)$
−1711	(28)	1	$(2^{57},37571058^2)$	**−1716**	$(2^2,4)$	49	$(2^{26},4^2,20^2)$
−1720	$(2,6)$	1	$(2^{71},4^{14},416,1248)$	**−1723**	(5)	0	$(2^{65},284326^2)$
−1727	(36)	6	$(2^{45},20^2,95591944220,286775832660)$	**−1731**	(8)	23	$(2^{39},98^2)$

Cohomology data for $\mathrm{GL}_2(\mathcal{O})$.

D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$
−1732	(12)	17	$(2^{36}, 4^9, 12, 888^2)$	**−1735**	(26)	0	$(2^{70}, 40^2, 13889800^2)$
−1736	$(2, 12)$	20	$(2^{22}, 4^{12}, 15748^2)$	**−1739**	(20)	1	$(2^{50}, 8^4, 48^2, 5712^2)$
−1743	$(2, 12)$	34	$(2^{30}, 8492^2)$	**−1747**	(5)	0	$(2^{66}, 484422^2)$
−1748	$(2, 10)$	24	$(2^{22}, 4^{10}, 8^2, 32^2)$	**−1751**	(48)	0	$(2^{53}, 8^2, 966529633944^2)$
−1752	$(2, 4)$	26	$(2^{45}, 4^9, 12)$	**−1759**	(27)	0	$(2^{58}, 4949066249330^2)$
−1763	(12)	1	$(2^{60}, 276888^2)$	**−1767**	$(2, 16)$	29	$(2^{28}, 4658^2)$
−1768	$(2, 4)$	11	$(2^{55}, 4^{12}, 8^2)$	**−1771**	$(2, 4)$	19	$(2^{46}, 32^2)$
−1779	(10)	24	$(2^{38}, 4102^2)$	**−1780**	$(2, 4)$	23	$(2^{55}, 4^6, 32^2)$
−1783	(17)	0	$(2^{64}, 740992990^2)$	**−1784**	(32)	0	$(2^{30}, 4^{24}, 8^4, 5168^2)$
−1787	(7)	0	$(2^{64}, 6^2, 12408^2)$	**−1795**	(8)	0	$(2^{72}, 4^2, 8^8, 32^2)$
−1796	(20)	18	$(2^{30}, 4^{10}, 455116^2)$	**−1799**	(50)	10	$(2^{32}, 6^4, 48^4, 23623152^2)$
−1803	(8)	24	$(2^{41}, 374^2)$	**−1807**	(12)	0	$(2^{69}, 12^4, 52597908^2)$
−1811	(23)	0	$(2^{53}, 6^2, 12^2, 4878492^2)$	**−1812**	$(2, 6)$	43	$(2^{28}, 12^6)$
−1816	(14)	0	$(2^{57}, 4^{12}, 28^4, 4564^2)$	**−1819**	(10)	0	$(2^{68}, 1254^2)$
−1823	(45)	0	$(2^{52}, 4^6, 44^2, 585510112^2)$	**−1828**	(8)	18	$(2^{42}, 4^8, 2972^2)$
−1831	(19)	0	$(2^{65}, 7575983173342^2)$	**−1832**	(26)	9	$(2^{33}, 4^{16}, 8^2, 16^4, 4192^2)$
−1835	(10)	0	$(2^{76}, 6^4, 18^2, 23256^2)$	**−1839**	(40)	25	$(2^{28}, 14^2, 5315310^2)$
−1843	(6)	3	$(2^{65}, 6, 4608, 13824)$	**−1844**	(30)	19	$(2^{28}, 4^6, 53022924^2)$
−1847	(43)	0	$(2^{44}, 6^8, 42^2, 380953222062^2)$	**−1848**	(2^3)	46	$(2^{40}, 4^4)$
−1851	(14)	25	$(2^{36}, 1066^2)$	**−1855**	$(2, 14)$	12	$(2^{54}, 4^4, 8^8, 33936^2)$
−1860	$(2^2, 4)$	54	$(2^{36}, 12^2)$	**−1864**	(8)	9	$(2^{43}, 4^{16}, 12^2, 3684^2)$
−1867	(5)	0	$(2^{69}, 4^2, 26852^2)$	**−1871**	(45)	0	$(2^{54}, 2131995618097978, 6395986854293934)$
−1876	$(2, 8)$	30	$(2^{37}, 4^4, 76^2)$	**−1879**	(27)	2	$(2^{65}, 370149923890, 1110449771670)$
−1880	$(2, 10)$	1	$(2^{66}, 4^{12}, 8^8, 32^2, 64^2)$	**−1883**	(14)	11	$(2^{52}, 50^2)$
−1887	$(2, 10)$	27	$(2^{50}, 4^4, 12^2, 192^2)$	**−1891**	(10)	2	$(2^{62}, 4^4, 10140^2)$
−1892	$(2, 6)$	27	$(2^{31}, 4^{12}, 56^2)$	**−1895**	(48)	0	$(2^{45}, 4^{16}, 12^8, 104478262968, 313434788904)$
−1896	$(2, 10)$	38	$(2^{32}, 4^2, 8^2, 168^2)$	**−1903**	(22)	7	$(2^{60}, 32765718262^2)$
−1907	(13)	0	$(2^{59}, 6^6, 8165052^2)$	**−1912**	(8)	0	$(2^{64}, 4^{14}, 8^2, 24^2, 29304^2)$
−1915	(6)	0	$(2^{88}, 8910^2)$	**−1919**	(44)	4	$(2^{55}, 1063186253789422^2)$
−1923	(10)	26	(2^{44})	**−1924**	$(2, 8)$	20	$(2^{44}, 4^8, 8^2, 496^2)$
−1927	(18)	1	$(2^{72}, 5046522360^2)$	**−1928**	(20)	9	$(2^{39}, 4^{13}, 12, 156^2, 50700^2)$
−1931	(21)	0	$(2^{58}, 77646526^2)$	**−1939**	(8)	11	$(2^{60}, 1558, 4674)$
−1940	$(2, 10)$	23	$(2^{50}, 4^8, 1680^2)$	**−1943**	(32)	1	$(2^{59}, 8^6, 3500179185696^2)$

Cohomology data for $\mathrm{GL}_2(\mathcal{O})$.

D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$
−1947	$(2,4)$	33	$(2^{40},22^{2})$	**−1951**	(33)	0	$(2^{63},1165853608330802,3497560824992406)$
−1955	$(2,6)$	3	$(2^{72},4^{8},12^{6},84,252)$	**−1956**	$(2,10)$	46	$(2^{27},44^{4})$
−1959	(42)	27	$(2^{34},24^{2},6913992^{2})$	**−1963**	(6)	0	$(2^{80},7598^{2})$
−1967	(36)	11	$(2^{49},34^{2},7067459542726,21202378628178)$	**−1972**	$(2,6)$	21	$(2^{52},4^{6},76^{2})$
−1976	$(2,14)$	4	$(2^{47},4^{26},12^{2},6816^{2})$	**−1979**	(23)	0	$(2^{58},2031365396918^{2})$
−1983	(16)	27	$(2^{46},825740864^{2})$	**−1987**	(7)	0	$(2^{74},880916^{2})$
−1988	$(2,12)$	32	$(2^{28},4^{10},8^{2},160^{2})$	**−1991**	(56)	7	$(2^{47},27378798189524990^{2})$
−1992	$(2,4)$	37	$(2^{36},4^{10},1220^{2})$	**−1995**	(2^{3})	51	$(2^{44},4^{2})$
−1999	(27)	0	$(2^{68},102328757648422^{2})$	**−2003**	(9)	0	$(2^{73},4427404^{2})$
−2004	$(2,8)$	48	$(2^{31},4^{6},20^{2})$	**−2008**	(14)	0	$(2^{66},4^{12},8^{4},1432^{2})$
−2011	(7)	0	$(2^{77},127482^{2})$	**−2015**	$(2,26)$	2	$(2^{76},4^{2},30483233868^{2})$
−2019	(16)	27	$(2^{39},6170^{2})$	**−2020**	$(2,4)$	24	$(2^{58},4^{12},116^{2})$
−2024	$(2,14)$	20	$(2^{30},4^{16},7840^{2})$	**−2027**	(11)	0	$(2^{68},4,12^{3},2375018628^{2})$
−2031	(38)	28	$(2^{34},18^{2},491290416^{2})$	**−2035**	$(2,4)$	10	(2^{86})
−2036	(30)	21	$(2^{32},4^{15},12,87324^{2})$	**−2039**	(45)	0	$(2^{55},4^{6},436716088097532945 2^{2})$
−2040	$(2^{2},4)$	41	$(2^{66},4^{4})$	**−2047**	(18)	3	$(2^{68},6^{6},36^{2},121067316^{2})$
−2051	(18)	16	$(2^{48},14^{2},1442,4326)$	**−2055**	$(2,14)$	33	$(2^{44},4^{10},869876^{2})$
−2056	(16)	10	$(2^{44},4^{14},8^{6},162496^{2})$	**−2059**	(8)	1	$(2^{80},4^{2},24^{2},3360^{2})$
−2063	(45)	0	$(2^{64},4^{2},22948796104775724^{2})$	**−2067**	$(2,4)$	30	$(2^{55},6,408^{2})$
−2068	$(2,6)$	32	$(2^{44},4^{6},24^{2})$	**−2071**	(30)	4	$(2^{66},562442615110^{2})$
−2072	$(2,8)$	13	$(2^{59},4^{18},3336^{2})$	**−2083**	(7)	0	$(2^{76},4^{2},462284^{2})$
−2084	(32)	21	$(2^{30},4^{10},45724284^{2})$	**−2087**	(35)	0	$(2^{76},41084690450639741798^{2})$
−2091	$(2,6)$	29	$(2^{50},28^{2},84^{2})$	**−2095**	(16)	2	$(2^{77},4^{16},12^{2},26555390040^{2})$
−2099	(19)	0	$(2^{67},6448^{2})$				

Cohomology data for $\mathrm{GL}_2(\mathcal{O})$.

5. Cohomology data for $\mathrm{SL}_2(\mathcal{O})$

D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$
−3	()	0	()	**−4**	()	0	()	**−7**	()	0	()	**−8**	()	0	()
−11	()	0	()	**−15**	(2)	0	()	**−19**	()	0	()	**−20**	(2)	0	()
−23	(3)	0	()	**−24**	(2)	0	()	**−31**	(3)	0	()	**−35**	(2)	1	()
−39	(4)	0	()	**−40**	(2)	1	()	**−43**	()	1	()	**−47**	(5)	0	()
−51	(2)	1	()	**−52**	(2)	1	()	**−55**	(4)	1	()	**−56**	(4)	1	()
−59	(3)	1	()	**−67**	()	2	()	**−68**	(4)	1	()	**−71**	(7)	0	()
−79	(5)	1	()	**−83**	(3)	2	()	**−84**	(2^2)	3	()	**−87**	(6)	2	()
−88	(2)	3	()	**−91**	(2)	3	()	**−95**	(8)	1	()	**−103**	(5)	2	()
−104	(6)	2	()	**−107**	(3)	3	(3)	**−111**	(8)	2	()	**−115**	(2)	5	()
−116	(6)	3	()	**−119**	(10)	1	()	**−120**	(2^2)	6	()	**−123**	(2)	5	()
−127	(5)	3	()	**−131**	(5)	3	()	**−132**	(2^2)	6	()	**−136**	(4)	4	()
−139	(3)	4	()	**−143**	(10)	2	()	**−148**	(2)	6	()	**−151**	(7)	3	()
−152	(6)	4	()	**−155**	(4)	6	()	**−159**	(10)	4	()	**−163**	()	6	()
−164	(8)	4	()	**−167**	(11)	2	()	**−168**	(2^2)	9	()	**−179**	(5)	5	()
−183	(8)	6	()	**−184**	(4)	7	()	**−187**	(2)	7	()	**−191**	(13)	2	()
−195	(2^2)	11	()	**−199**	(9)	4	()	**−203**	(4)	8	()	**−211**	(3)	7	()
−212	(6)	8	()	**−215**	(14)	4	()	**−219**	(4)	9	()	**−223**	(7)	8	()
−227	(5)	7	()	**−228**	(2^2)	12	()	**−231**	$(2, 6)$	9	()	**−232**	(2)	10	()
−235	(2)	11	()	**−239**	(15)	3	()	**−244**	(6)	9	()	**−247**	(6)	8	()
−248	(8)	8	()	**−251**	(7)	7	()	**−255**	$(2, 6)$	11	()	**−259**	(4)	10	()
−260	$(2, 4)$	12	()	**−263**	(13)	5	()	**−264**	$(2, 4)$	12	()	**−267**	(2)	13	()
−271	(11)	6	()	**−276**	$(2, 4)$	15	()	**−280**	(2^2)	15	()	**−283**	(3)	10	()
−287	(14)	7	()	**−291**	(4)	13	()	**−292**	(4)	12	()	**−295**	(8)	11	()
−296	(10)	9	(2^2)	**−299**	(8)	10	(3)	**−303**	(10)	12	()	**−307**	(3)	11	()
−308	$(2, 4)$	15	()	**−311**	(19)	4	()	**−312**	(2^2)	18	()	**−319**	(10)	10	()
−323	(4)	12	()	**−327**	(12)	12	()	**−328**	(4)	13	()	**−331**	(3)	12	(3)
−335	(18)	8	()	**−339**	(6)	15	()	**−340**	(2^2)	19	()	**−344**	(10)	11	(2^2)
−347	(5)	12	()	**−355**	(4)	16	()	**−356**	(12)	12	()	**−359**	(19)	6	(2^2)
−367	(9)	11	(3^3)	**−371**	(8)	14	()	**−372**	(2^2)	23	()	**−376**	(8)	14	()
−379	(3)	14	()	**−383**	(17)	8	()	**−388**	(4)	17	()	**−391**	(14)	11	()
−395	(8)	16	(2^2)	**−399**	$(2, 8)$	17	()	**−403**	(2)	17	()	**−404**	(14)	14	()
−407	(16)	13	()	**−408**	(2^2)	23	(3)	**−411**	(6)	19	()	**−415**	(10)	18	()
−419	(9)	13	(3)	**−420**	(2^3)	33	()	**−424**	(6)	17	(2^2)	**−427**	(2)	19	()

Cohomology data for $\mathrm{SL}_2(\mathcal{O})$.

D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$
−431	(21)	8	(2)	**−435**	(2^2)	27	$()$	**−436**	(6)	19	(2^2)	**−439**	(15)	11	$()$
−440	$(2,6)$	20	$()$	**−443**	(5)	16	$()$	**−447**	(14)	18	$()$	**−451**	(6)	17	$()$
−452	(8)	19	(2^2)	**−455**	$(2,10)$	19	(2^2)	**−456**	$(2,4)$	24	(2^2)	**−463**	(7)	16	$()$
−467	(7)	16	$()$	**−471**	(16)	18	$()$	**−472**	(6)	19	(2^2)	**−479**	(25)	8	(3^2)
−483	(2^2)	29	$()$	**−487**	(7)	17	(13^2)	**−488**	(10)	18	(2^2)	**−491**	(9)	16	$()$
−499	(3)	19	(3^2)	**−503**	(21)	11	(6)	**−511**	(14)	17	$()$	**−515**	(6)	23	$()$
−516	$(2,6)$	28	$()$	**−519**	(18)	20	(3^2)	**−520**	(2^2)	28	(2^2)	**−523**	(5)	19	$()$
−527	(18)	15	(3^2)	**−532**	(2^2)	29	$()$	**−535**	(14)	20	(6^2)	**−536**	(14)	18	(2^4)
−543	(12)	24	$()$	**−547**	(3)	21	(6^2)	**−548**	(8)	24	(4^2)	**−551**	(26)	12	(4^2)
−552	$(2,4)$	31	$()$	**−555**	(2^2)	35	$()$	**−559**	(16)	17	(4^2)	**−563**	(9)	19	(2^4)
−564	$(2,4)$	35	(2^2)	**−568**	(4)	25	(2^2)	**−571**	(5)	23	$()$	**−579**	(8)	27	$()$
−580	$(2,4)$	32	$()$	**−583**	(8)	23	$()$	**−584**	(16)	19	$(2^2,6,18)$	**−587**	(7)	21	(3^3)
−591	(22)	22	(3^2)	**−595**	(2^2)	33	(3)	**−596**	(14)	26	$()$	**−599**	(25)	13	(71^2)
−607	(13)	19	$()$	**−611**	(10)	23	$()$	**−615**	$(2,10)$	31	$(2,6)$	**−616**	$(2,4)$	31	(2^2)
−619	(5)	23	(3^2)	**−623**	(22)	19	(2^2)	**−627**	(2^2)	35	$()$	**−628**	(6)	29	$()$
−631	(13)	20	(25^2)	**−632**	(8)	26	$(2^2,4^4)$	**−635**	(10)	27	$()$	**−643**	(3)	27	(3)
−644	$(2,8)$	31	(2^2)	**−647**	(23)	16	(53^2)	**−651**	$(2,4)$	37	$()$	**−655**	(12)	27	(18^2)
−659	(11)	22	(11^2)	**−660**	(2^3)	53	$()$	**−663**	$(2,8)$	35	(3)	**−664**	(10)	26	(2^4)
−667	(4)	28	$()$	**−671**	(30)	16	(3^2)	**−679**	(18)	23	(3^2)	**−680**	$(2,6)$	35	(2^4)
−683	(5)	26	$()$	**−687**	(12)	34	(6^2)	**−691**	(5)	26	(7^2)	**−692**	(14)	29	(2^2)
−695	(24)	23	(4^6)	**−696**	$(2,6)$	38	$()$	**−699**	(10)	33	(3^2)	**−703**	(14)	24	(16^2)
−707	(6)	31	(2^2)	**−708**	(2^2)	46	(2^2)	**−712**	(8)	29	(2^2)	**−715**	(2^2)	39	$()$
−719	(31)	15	(31^2)	**−723**	(4)	37	(2^2)	**−724**	(10)	32	(4^2)	**−727**	(13)	24	(37^2)
−728	$(2,6)$	35	(2^4)	**−731**	(12)	26	(8^2)	**−739**	(5)	28	$()$	**−740**	$(2,8)$	42	$()$
−743	(21)	21	(61^2)	**−744**	$(2,6)$	45	$()$	**−751**	(15)	24	(8^2)	**−755**	(12)	32	(2^6)
−759	$(2,12)$	35	$()$	**−760**	(2^2)	42	(2^2)	**−763**	(4)	34	$()$	**−767**	(22)	28	$(2^4,4^4)$
−771	(6)	39	(3^3)	**−772**	(4)	37	$(2^3,6)$	**−776**	(20)	26	(2^6)	**−779**	(10)	31	(4^2)
−787	(5)	30	$()$	**−788**	(10)	36	(2^6)	**−791**	(32)	22	(59^2)	**−795**	(2^2)	51	$()$
−799	(16)	32	(2^4)	**−803**	(10)	31	(3^2)	**−804**	$(2,6)$	48	(2^2)	**−807**	(14)	38	$()$
−808	(6)	35	(2^2)	**−811**	(7)	30	(5^4)	**−815**	(30)	28	$(2^2,4^2)$	**−820**	$(2,4)$	47	(4^2)
−823	(9)	30	$(3^6,9^2)$	**−824**	(20)	29	$(2^4,4^4)$	**−827**	(7)	31	$()$	**−831**	(28)	32	(22^2)
−835	(6)	39	(3^3)	**−836**	$(2,10)$	38	(2^2)	**−839**	(33)	19	$()$	**−840**	(2^3)	65	$()$
−843	(6)	43	$()$	**−851**	(10)	33	$(3^2,6^2)$	**−852**	$(2,4)$	57	(2^2)	**−856**	(6)	39	$(2^4,4^2)$

Cohomology data for $\mathrm{SL}_2(\mathcal{O})$.

D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$
$-\mathbf{859}$	(7)	32	(3^4)	$-\mathbf{863}$	(21)	28	$(3^5, 9^5)$	$-\mathbf{868}$	$(2,4)$	47	(2^2)
$-\mathbf{871}$	(22)	28	(65^2)	$-\mathbf{872}$	(10)	36	$(2^4, 6^4)$	$-\mathbf{879}$	(22)	38	(149^2)
$-\mathbf{883}$	(3)	35	$()$	$-\mathbf{884}$	$(2,8)$	43	$(2^2, 4^2)$	$-\mathbf{887}$	(29)	23	$(2^2, 754^2)$
$-\mathbf{888}$	$(2,6)$	50	(2^4)	$-\mathbf{895}$	(16)	37	(4^6)	$-\mathbf{899}$	(14)	33	(3^4)
$-\mathbf{903}$	$(2,8)$	49	$()$	$-\mathbf{904}$	(8)	38	$(2^6, 6^2)$	$-\mathbf{907}$	(3)	36	(13^2)
$-\mathbf{911}$	(31)	23	$(2^4, 22^2)$	$-\mathbf{915}$	$(2,4)$	57	(3)	$-\mathbf{916}$	(10)	42	$(2^4, 4^2)$
$-\mathbf{919}$	(19)	29	(19^2)	$-\mathbf{920}$	$(2,10)$	47	$(2^2, 4^2)$	$-\mathbf{923}$	(10)	37	$()$
$-\mathbf{932}$	(12)	42	(2^6)	$-\mathbf{935}$	$(2,14)$	39	(4^2)	$-\mathbf{939}$	(8)	47	$()$
$-\mathbf{943}$	(16)	36	$(9^2, 72^2)$	$-\mathbf{947}$	(5)	37	(89^2)	$-\mathbf{948}$	$(2,6)$	61	$(2,6)$
$-\mathbf{951}$	(26)	40	(57^2)	$-\mathbf{952}$	$(2,4)$	51	(2^2)	$-\mathbf{955}$	(4)	46	$(2^2, 6^2)$
$-\mathbf{959}$	(36)	28	$(3^2, 9^2, 18, 36)$	$-\mathbf{964}$	(12)	43	$(2^2, 26^2)$	$-\mathbf{967}$	(11)	35	(1787^2)
$-\mathbf{971}$	(15)	35	(3^3)	$-\mathbf{979}$	(8)	40	(5^2)	$-\mathbf{983}$	(27)	28	$(3^8, 9^2)$
$-\mathbf{984}$	$(2,6)$	55	(2^4)	$-\mathbf{987}$	$(2,4)$	59	$()$	$-\mathbf{991}$	(17)	33	(5281^2)
$-\mathbf{995}$	(8)	46	$(2^4, 6^4)$	$-\mathbf{996}$	$(2,6)$	62	$(2^2, 6^2)$	$-\mathbf{1003}$	(4)	44	(3^2)
$-\mathbf{1007}$	(30)	30	$(1335, 4005)$	$-\mathbf{1011}$	(12)	49	$()$	$-\mathbf{1012}$	(2^2)	57	(2^4)
$-\mathbf{1015}$	$(2,8)$	53	(14^2)	$-\mathbf{1016}$	(16)	40	$(2^{14}, 8^2)$	$-\mathbf{1019}$	(13)	36	(23^2)
$-\mathbf{1023}$	$(2,8)$	57	(12^2)	$-\mathbf{1027}$	(4)	44	$(3, 6^2)$	$-\mathbf{1028}$	(16)	45	(2^8)
$-\mathbf{1031}$	(35)	26	(8105^2)	$-\mathbf{1032}$	$(2,4)$	60	(2^6)	$-\mathbf{1039}$	(23)	32	$(5^2, 515^2)$
$-\mathbf{1043}$	(8)	46	(51^2)	$-\mathbf{1047}$	(16)	50	(331^2)	$-\mathbf{1048}$	(6)	46	$(2^2, 4^4, 20, 60)$
$-\mathbf{1051}$	(5)	43	(13^2)	$-\mathbf{1055}$	(36)	35	$(2^{11}, 924^2)$	$-\mathbf{1059}$	(6)	55	$()$
$-\mathbf{1060}$	$(2,4)$	62	(8^2)	$-\mathbf{1063}$	(19)	35	(1117^2)	$-\mathbf{1064}$	$(2,10)$	49	$(2^6, 10^2)$
$-\mathbf{1067}$	(12)	44	$(16, 48)$	$-\mathbf{1076}$	(22)	45	$(2^4, 74^2)$	$-\mathbf{1079}$	(34)	32	(171760^2)
$-\mathbf{1087}$	(9)	41	$(3, 5709^2)$	$-\mathbf{1091}$	(17)	37	$(3^2, 33^2)$	$-\mathbf{1092}$	(2^3)	85	$()$
$-\mathbf{1095}$	$(2,14)$	59	(4^6)	$-\mathbf{1096}$	(12)	45	$(2^8, 4^2)$	$-\mathbf{1099}$	(6)	49	(13^2)
$-\mathbf{1103}$	(23)	35	$(2^2, 1222^2)$	$-\mathbf{1108}$	(6)	54	(2^6)	$-\mathbf{1111}$	(22)	40	$(2^2, 976^2)$
$-\mathbf{1112}$	(14)	45	$(2^{12}, 126^2)$	$-\mathbf{1115}$	(10)	51	$(2^2, 8^2)$	$-\mathbf{1119}$	(32)	46	(13^4)
$-\mathbf{1123}$	(5)	44	(7^2)	$-\mathbf{1124}$	(20)	48	$(2^4, 574^2)$	$-\mathbf{1128}$	$(2,4)$	67	(2^6)
$-\mathbf{1131}$	$(2,4)$	65	$(5, 15)$	$-\mathbf{1135}$	(18)	48	$(4^2, 60^2)$	$-\mathbf{1139}$	(16)	42	$(2^2, 290^2)$
$-\mathbf{1140}$	$(2^2, 4)$	89	(2^4)	$-\mathbf{1144}$	$(2,6)$	56	(2^6)	$-\mathbf{1147}$	(6)	49	$()$
$-\mathbf{1151}$	(41)	28	(375617855^2)	$-\mathbf{1155}$	(2^3)	89	$()$	$-\mathbf{1159}$	(16)	43	(59^2)
$-\mathbf{1160}$	$(2,10)$	58	$(2^2, 28, 84)$	$-\mathbf{1163}$	(7)	45	(178^2)	$-\mathbf{1167}$	(22)	54	(332^2)
$-\mathbf{1171}$	(7)	45	(14^2)	$-\mathbf{1172}$	(18)	52	$(2^2, 110^2)$	$-\mathbf{1187}$	(9)	45	(143^2)
$-\mathbf{1191}$	(24)	54	(9296^2)	$-\mathbf{1192}$	(6)	53	$(2^6, 4, 12)$	$-\mathbf{1195}$	(8)	56	$(2^2, 6^4)$

Cohomology data for $\mathrm{SL}_2(\mathcal{O})$.

D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$	D	$\mathrm{Cl}(D)$	H^2_{cusp}	$(H_1)_{\mathrm{tors}}$
$\mathbf{-1199}$	(38)	36	(2461^2)	$\mathbf{-1203}$	(6)	65	(15^2)	$\mathbf{-1204}$	$(2,4)$	67	(2^4)
$\mathbf{-1207}$	(18)	45	(125^2)	$\mathbf{-1208}$	(12)	51	$(2^{14},40,120)$	$\mathbf{-1211}$	(14)	51	(43^2)
$\mathbf{-1219}$	(6)	51	(29^2)	$\mathbf{-1220}$	$(2,8)$	70	(2^6)	$\mathbf{-1223}$	(35)	34	(808^2)
$\mathbf{-1227}$	(4)	65	(4^2)	$\mathbf{-1231}$	(27)	38	$(2^8,544^2)$	$\mathbf{-1235}$	$(2,6)$	63	(3^2)
$\mathbf{-1236}$	$(2,6)$	81	(2^2)	$\mathbf{-1239}$	$(2,16)$	63	$(7^2,273^2)$	$\mathbf{-1240}$	$(2,4)$	67	$(2^6,10^2)$
$\mathbf{-1243}$	(4)	54	(3^4)	$\mathbf{-1247}$	(26)	42	(163^2)				

Cohomology data for $\mathrm{SL}_2(\mathcal{O})$.

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