
Contents

Acknowledgments	ix
Chapter 1. Introduction	1
Bibliography	21
Chapter 2. Arithmetic intersection theory on stacks	27
2.1 The one-dimensional case	27
2.2 $\text{Pic}(\mathcal{M})$, $\text{CH}_{\mathbb{Z}}^1(\mathcal{M})$, and $\text{CH}_{\mathbb{Z}}^2(\mathcal{M})$	30
2.3 Green functions	31
2.4 $\widehat{\text{Pic}}(\mathcal{M})$, $\widehat{\text{CH}}_{\mathbb{Z}}^1(\mathcal{M})$, and $\widehat{\text{CH}}_{\mathbb{Z}}^2(\mathcal{M})$	34
2.5 The pairing $\widehat{\text{CH}}^1(\mathcal{M}) \times \widehat{\text{CH}}^1(\mathcal{M}) \rightarrow \widehat{\text{CH}}^2(\mathcal{M})$	36
2.6 Arakelov heights	38
2.7 The arithmetic adjunction formula	39
Bibliography	43
Chapter 3. Cycles on Shimura curves	45
3.1 Shimura curves	46
3.2 Uniformization	47
3.3 The Hodge bundle	49
3.4 Special endomorphisms	51
3.5 Green functions	56
3.6 Special 0-cycles	57
Bibliography	68
Chapter 4. An arithmetic theta function	71
4.1 The structure of arithmetic Chow groups	71
4.2 The arithmetic theta function	77
4.3 The vertical component: definite theta functions	79
4.4 The analytic component: Maass forms	87
4.5 The Mordell-Weil component	94
4.6 Borcherds' generating function	96
4.7 An intertwining property	100
Bibliography	102
Chapter 5. The central derivative of a genus two Eisenstein series	105
5.1 Genus two Eisenstein series	105
5.2 Nonsingular Fourier coefficients	111

5.3	The Siegel-Weil formula	121
5.4	Singular coefficients	137
5.5	Eisenstein series of genus one	139
5.6	B_T	140
5.7	W_T	144
5.8	The central derivative—the rank one case	154
5.9	The constant term	161
	Bibliography	165
Chapter 6. The generating function for 0-cycles		167
6.1	The case $T > 0$ with $\text{Diff}(T, B) = \{p\}$ for $p \nmid D(B)$	169
6.2	The case $T > 0$ with $\text{Diff}(T, B) = \{p\}$ for $p \mid D(B)$	172
6.3	The case of nonsingular T with $\text{sig}(T) = (1, 1)$ or $(0, 2)$	175
6.4	Singular terms, T of rank 1	177
6.5	The constant term, $T = 0$	179
	Bibliography	180
Chapter 6 Appendix. The case $p = 2, p \mid D(B)$		181
6A.1	Statement of the result	181
6A.2	Review of the special cycles $Z(j)$, for $q(j) \in \mathbb{Z}_p \setminus \{0\}$	186
6A.3	Configurations	188
6A.4	Calculations	191
6A.5	The first nondiagonal case	201
	Bibliography	204
Chapter 7. An inner product formula		205
7.1	Statement of the main result	206
7.2	The case $t_1 t_2$ is not a square	208
7.3	A weakly admissible Green function	212
7.4	A finer decomposition of special cycles	221
7.5	Application of adjunction	225
7.6	Contributions for $p \mid D(B)$	231
7.7	Contributions for $p \nmid D(B)$	238
7.8	Computation of the discriminant terms	245
7.9	Comparison for the case $t_1, t_2 > 0$, and $t_1 t_2 = m^2$	252
7.10	The case $t_1, t_2 < 0$ with $t_1 t_2 = m^2$	259
7.11	The constant terms	262
	Bibliography	264
Chapter 8. On the doubling integral		265
8.1	The global doubling integral	266
8.2	Review of Waldspurger's theory	269
8.3	An explicit doubling formula	279
8.4	Local doubling integrals	285
8.5	Appendix: Coordinates on metaplectic groups	320
	Bibliography	346

CONTENTS	vii
Chapter 9. Central derivatives of L-functions	351
9.1 The arithmetic theta lift	351
9.2 The arithmetic inner product formula	356
9.3 The relation with classical newforms	365
Bibliography	369
Index	371

