compactification, the normal bundle is anti-ample; which explains in another way why we have the nonpositive powers of this invertible sheaf.)

Since V is of Hodge type $\{(-1,0),(0,-1)\}$, we can also consider the mixed Shimura data $V \rtimes (P,X)$. The resulting family of abelian varieties inherits multiplication by E, which leads to a nodular interpretation of $M^K f(P,X)$. A suitable extension of this family in terms of toroidal compactification can, as in 10.17–10.22, be described as degeneration of such abelian varieties. All these structures can, of course, be described in terms of the morphisms in 12.4.

Bibliography

[AMRT] A. Ash, D. Mumford, M. Rapoport, Y. Tai, Smooth compactification of locally symmetric varieties. Lie groups: History, Frontiers and Applications. Math. Sci. Press, Brookline, Mass. (1975)

[B] A. Borel, Introduction aux groupes arithmétiques. Hermann, Paris (1969)

[Br] J.-L. Brylinski, "1-motifs" et formes automorphes (théorie arithmétique des domaines de Siegel), prépublication du Centre de Math. de l'Ecole Polytechnique, (1979)

[BB] W. L. Baily, A. Borel, Compactification of arithmetic quotients of bounded symmetric domains. Annals of Math. (2) 84 (1966), 442-528

[BPV] W. Barth, C. Peters, A. Van de Vèn, Compact complex surfaces, Springer, Berlin (1984)

[BT] A. Borel, J Tits, Groupes réductifs. Publ. Math. IHES 27 (1965), 55-150

[B-AG] N. Bourbaki, Algèbre commutative, Hermann, Paris (1961)

[B-Lie] N. Bourbaki, Groupes et algèbres de Lie, IV-VI: Hermann, Paris (1968), VII-VIII: Paris (1975)

[C] C.-L. Chai, Compactification of Siegel moduli schemes, London Math. Soc. Lecture Notes Series 107, Cambridge Univ. Press (1985)

[CK] E. Cattani, A. Kaplan, On the SL_2-orbits in Hodge theory, Preprint IHES/M/82/58 (1982)

[D1] P. Deligne, Travaux de Shimura. Séminaire Bourbaki, Exp. n° 389, SLN 244 (1971), 123-165

[D2] P. Deligne, Variétés de Shimura: Interprétation modulaire, et techniques de construction de modèles canoniques. Proc. Sympos. Pure Math. AMS, 33 part 2 (1979), 247-290

[D3] P. Deligne, Théorie de Hodge II, Publ. Math. IHES 40 (1971), 5-58

[DR] P. Deligne, M. Rapoport, Les schémas de modules de courbes elliptiques. Modular functions of one variable, II, SLN 349 (1972), 143-316

[EGA-I] A. Grothendieck, J. A. Dieudonné, Eléments de géométrie algébrique I, Springer Grundlehren 166, Berlin (1971)

[EGA-II] A. Grothendieck, J. A. Dieudonné, Eléments de géométrie algébrique II, Publ. Math. IHES 8 (1961)

[F1] G. Faltings, "Arithmetic varieties and rigidity", in: Séminaire de théorie de nombres de Paris, 1982-83, Birkhäuser, Boston (1984), 63-77

[F2] G. Faltings, Arithmetische Kompaktifizierung des Modulraums der abelschen Varietäten, in Proceedings Arbeitstagung Bonn 1984, SLN 1111 (1985), 321-383

[G] R. Godement, Domaines fondamentaux des groupes arithmétiques, Sém. Bourbaki, exp. 257 (1963)

[GR] H. Grauert, R. Remmert, Coherent analytic sheaves, Springer Grundlehren 265, Berlin (1984)

[Ha1] M. Harris, Arithmetic vector bundles and automorphic forms on Shimura varieties I, Inventiones Math. 82 (1985) 151-189,

[Ha2] M. Harris, Arithmetic vector bundles and automorphic forms on Shimura varieties II, Compositio Math. 60 (1986) 323-378

[Ha3] M. Harris, Functorial properties of toroidal compactifications of locally symmetric varieties, to appear in Proc. London Math. Soc.

[H1] R. Hartshorne, Ample subvarieties of algebraic varieties, SLN 156 (1970)

[H2] R. Hartshorne, Algebraic geometry, Springer GTM 52 (1977)

[KKMS] G. Kempf, F. Knudsen, D. Mumford, B. Saint-Donat, Toroidal embeddings I, SLN 339 (1973)

[K] D. Knutson, Algebraic spaces, SLN 203 (1971)

[Mi1] J. S. Milne, The action of an automorphism of $\mathbb{C}$ on a Shimura variety and its special points. Arithmetic and Geometry, Pap. dedic. I. R. Shafarevich, Vol. I, Prog. Math. 35 (1983), 239-265

[Mi2] J. S. Milne, Canonical models of (mixed) Shimura varieties and automorphic vector bundles, to appear.

[M1] D. Mumford, Abelian varieties, Oxford University Press (1970)

[M2] D. Mumford, On the equations defining abelian varieties, I-III, Inventiones Math. 1 (1966), 287-354; 3 (1967), 75-135 and 215-244

[M3] D. Mumford, J. Fogarty, Geometric invariant theory, Springer Berlin (1982)

[M4] D. Mumford, An analytic construction of degenerating abelian varieties over complete rings, Compositio Math. 24 (1972), 239-272

[N] Y. Namikawa, Toroidal compactification of Siegel spaces, SLN 812 (1980)

[Rag] M. S. Raghunathan, Discrete subgroups of Lie groups, Springer Berlin (1972)

[Rap] M. Rapoport, Compactifications de l'espace de modules de Hilbert-Blumenthal, Compositio Math. 36, no.3 (1978) 255-335

[SGA1] A. Grothendieck et al., Revêtements étales et groupe fondamental. Séminaire de géométrie algébrique du Bois-Marie 1960-61, SLN 224 (1971)

[S] J.-P. Serre, Géométrie algébrique et géométrie analytique, Ann. Inst. Fourier 6 (1955-56) 1-42

[Sh] G. Shimura, Introduction to the arithmetic theory of automorphic functions, Princeton Univ. Press (1971)

[Sp] E. Spanier, Algebraic topology, McGraw-Hill (1966)

List of frequently used symbols

$\mathbb{A}$, $\mathbb{A}_f$, $\mathbb{A}_K$, $\mathbb{A}_{K,f}$	adele ring	0.2
Ad_G, ad_G	adjoint operation	0.3
$A[d]$	group of d-division points	10.1
$B(\mathfrak{X}^o)$, $B(\mathfrak{X}^o,P_1)$	set of commutators	8.11
$\beta(P_1,\mathfrak{X}_1,P'_1,\mathfrak{X}'_1,p_f)$, $\bar{\beta}(P_1,\mathfrak{X}_1,P'_1,\mathfrak{X}'_1,p_f)$		
	certain maps in $\mathfrak{U}$, $\bar{\mathfrak{U}}$	6.11, 6.15
$\mathbb{C}$	set of complex numbers	0.2
$\mathfrak{C}(P,\mathfrak{X})$	conical complex	4.24
$C(\mathfrak{X}^o,P_1)$	open cone associated to boundary component	4.15
$C^*(\mathfrak{X}^o,P_1)$	union of all boundary components of $C(\mathfrak{X}^o,P_1)$	4.22
$(CSp_{2g},\mathcal{H}_{2g})$	Shimura data for the symplectic group	2.7
Δ_1	normalizer of a boundary stratum in the Baily-Borel compactification	6.3, 6.18, 7.3
e_σ	splitting associated to a cone σ	5.11, 8.5
$\exp L$	subgroup associated to sub-Lie algebra	0.3
$E(P,\mathfrak{X})$	reflex field	11.1
$e(X)$	canonical pairing $H(X)\times H(X)\to\mathbb{G}_m$	10.2
$\mathfrak{E}(\mathfrak{X}'^o,P'_1)$	set of splittings	9.2
$F^pM_{\mathbb{C}}$	Hodge filtration	1.1
G	semisimple part P/W	2.1
G^{ad}, G^{der}	adjoint, derived group	0.3
$(\mathbb{G}_{m,\mathbb{Q}},\mathcal{H}_0)$, $(\mathbb{G}_{m,\mathbb{Q}},h(\mathcal{H}_0))$		
	standard Shimura data	2.8
h	homomorphism $\mathbb{S}_{\mathbb{C}}\to P_{\mathbb{C}}$	1.4
h	equivariant map $\mathfrak{X}\to Hom(\mathbb{S}_{\mathbb{C}},P_{\mathbb{C}})$	2.1
H_0, h_0, h_∞	reference group and homomorphisms	4.3
$H(X)$	group of translations normalizing X	10.1
$\mathcal{H}_W$	conjugacy class of h: $\mathbb{S}_{\mathbb{C}}\to P_{\mathbb{C}}$	1.6

$(P_0, \mathfrak{X}_0)$	unipotent extension of $(\mathbb{G}_{m,\mathbb{Q}}, \mathcal{H}_0)$	2.24
$(P_{2g}, \mathfrak{X}_{2g})$	unipotent extension of $(CSp_{2g}, \mathcal{H}_{2g})$	2.25
$(P_{[\sigma]}, \mathfrak{X}_{[\sigma]})$	mixed Shimura data associated to $[\sigma]$	7.1
π	the positive real number	0.2
π, π'	projections $P \to G = P/W$, $P \to P/U$	2.1
$\pi_o(X)$	set of connected components	0.1
π_σ	canonical projection $T_\sigma \to \tilde{T}_\sigma$	5.2
$\pi_{[\sigma]}$	projection $(P, \mathfrak{X}) \to (P_{[\sigma]}, \mathfrak{X}_{[\sigma]})$	7.1
$[\pi]^*$	projection to Baily-Borel compactification	6.24, 9.25, 12.4
Q	admissible $\mathbb{Q}$-parabolic subgroup	4.5
$\mathcal{R}_{L/K} X$	Weil restriction	0.2
$\mathbb{R}$	set of real numbers	0.2
$\mathbb{S}$, $\mathbb{S}^1$	Deligne torus	1.3
$\mathcal{S}$, $\mathcal{S}(\mathfrak{X}^o, P_1, p_f)$	admissible (partial) cone decomposition	6.4
$\mathcal{S}^o$	subset of all cones along the unipotent fibre	6.5
$\mathcal{S}\|_{(P_1, \mathfrak{X}_1)}$	restriction to a boundary component	6.5
$\mathcal{S}_{[\sigma]}$	induced cone decomposition	7.7
$\mathcal{S}(f)$	cone decomposition associated to a piecewise linear convex rational function	5.20
$\mathcal{S}_\Sigma^+$, $\mathcal{S}_\Sigma'$, $\mathcal{S}_\Sigma$	cone decompositions associated to Σ	9.12
$\|\mathcal{S}\|$	support of a cone decomposition	5.1
σ^o	interior of a cone	5.1
σ_o	standard cone	5.10, 8.5, 9.1
$\check{\sigma}$	dual cone	5.1
$[\sigma]$	double coset of cones	7.1
Σ	locally polyhedral subset	9.8
$T_{\mathcal{S}}$	torus embedding	5.3
T_σ	affine torus embedding	5.2
$\tilde{T}_\sigma$	orbit in a torus embedding	5.2
U	weight -2 subgroup of P	2.1

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