Weil representations of Hilbert modular groups

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Abstract. We know that the well-known double cover Mp(2,Z) of SL(2,Z) acts on the group algebra C[M] of maps from M to the complex numbers C. Here M is the underlying group of a given finite quadratic Z-module (M,Q). We call the representation afforded by this action the 'Weil representation associated to (M,Q)'. It is remarkable to note that due to a recent result when we consider Weil representations of finite quadratic modules over number fields the double cover Mp(2,O) (O is the ring of integers of the number field in question), which is used in the theory of Hilbert modular forms of half integral weight, does not play the same role as in the case of the rational number field. We observe that there are more double covers available to satisfy this action in the general case. It actually depends on the splitting of the ideal generated by 2 in the number field. However, when we restrict ourselves to finite quadratic modules which are discriminant modules of lattices over O we see that the group Mp(2,O) acts on C[M]. For proving this we realize the Weil representations in question by theta functions.