

KIRILLOV MODELS FOR DISTINGUISHED REPRESENTATIONS

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§ 0. Introduction

In the theory of automorphic forms on covering groups of the general linear group, a central role is played by certain local representations which have unique Whittaker models. A representation with this property is called distinguished. In the case of the 2-sheeted cover of GL_2 , these representations arise as the local components of generalizations of the classical θ -function. They have been studied thoroughly in [GPS]. The Weil representation provides these representations with a very nice realization, and the local factors attached to these representations can be computed using this realization. It has been shown [KP] that only in the case of a certain 3-sheeted cover do we find other principal series of covering groups of GL_2 which have a unique Whittaker model. It is natural to ask if these distinguished representations also have a realization analogous to the Weil representation.

In this paper we investigate this question by constructing explicit Kirillov models for the distinguished principal series of the 2-sheeted and 3-sheeted covers of GL_2 over a p -adic field. In the case of the 2-sheeted cover, we find that the action of the Weyl element is given by a very simple formula. We use this formula to give a new computation of local L and ε -factors, the previous method in [GPS] relying heavily on the Weil representation. For the 3-sheeted cover, we calculate the action of the Weyl element, but it appears that the formula does not simplify, leading us to believe that there is no local analogue of the Weil representation in this case.

One ingredient of these calculations is the evaluation of Salie's sum over quotient rings of the ring of integers in a p -adic field. In this paper we carry this out by a direct calculation. It can also be shown that the

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