Title:	On the local constancy of certain mod p Galois representations
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Abstract:	In this thesis, we study local constancy in the weight space of the mod p reduction of certain irreducible 2-dimensional crystalline representations V k,a p of Gal Q̄ p /Q p using the mod p local Langlands correspondence for GL 2 (Q p). Indeed all irreducible 2-dimensional crystalline representations of Gal Q̄ p /Q p are a twist by a crystalline character of some V k,a p . Latter is uniquely determined by the Hodge-Tate weights (0, k − 1) and the trace of the Frobenius a p . Let V k,a p denote the mod p reduction of a Gal Q̄ p /Q p -stable lattice up to semisimplification. For a fixed a p , we study local constancy of V k,a p in the weight space. In order to prove local constancy, we show that V k ′ ,a p is constant for all k ′ □ k + p t (p − 1)Z >0 (t sufficiently large) by explicitly computing V k ′ ,a p . Latter is obtained using the mod p local Langlands correspondence for GL 2 (Q p). This gives local constancy in the punctured disk {k ′ | k ′ □ k + p t (p − 1)Z >0 } around k. Next, we determine the structure of V k,a p by applying a result of Berger-Li-Zhu together with Berger's local constancy theorem to establish constancy in the whole disk. This gives a lower bound on the radius of local constancy solely in terms of a p . Let k = b + c(p − 1) + 2 where 2 ≤ b ≤ p and 0 ≤ c ≤ p − 2. Broadly speaking, our results fall into two regimes (c, p − 1) and (1, c + 1) of the slope v(a p). In the former situation, we establish local constancy under certain constraints on b, c and v(a p). We also in this case improve on the lower bound for k in Berger's theorem guaranteeing local constancy. When v(a p) < c + 1, we establish local constancy (in the irreducible cases) for non-integral slope under the condition that b ≥ c + □v(a p)□ − 1 holds. Lastly, assuming a certain technical conjecture (for which we provide good evidence), we establish local constancy for certain subsets of b ≤ c + □v(a p)□ − 2 and such that the slope is non-integral, lying in (1, c − 1).
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