ERRATUM TO "UNIFORM APPROXIMATE FUNCTIONAL EQUATION FOR PRINCIPAL L-FUNCTIONS"

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In [H] the auxiliary function $F(s,\pi_\infty)$ was defined by (3.2) as the square-root of a certain quotient of exponential and gamma functions. While the quotient is holomorphic in the half plane $\Re s > -1/(m^2+1)$, it was erroneously concluded and used in the paper that the same holds for $F(s,\pi_\infty)$. I am indebted to Florin Spinu for bringing this problem to my attention. In this note I correct the error, so that all the theorems and corollaries of the paper hold true in their original form.

The above-mentioned difficulty can be resolved by defining $F(s,\pi_\infty)$ slightly differently as

$$F(s,\pi_\infty)=\frac{1}{2}C^{-s/2}N^s\frac{L\left(\frac{1}{2}+s,\pi_\infty\right)L\left(\frac{1}{2},\tilde{\pi}_\infty\right)}{L\left(\frac{1}{2}-s,\tilde{\pi}_\infty\right)L\left(\frac{1}{2},\pi_\infty\right)}+\frac{1}{2}C^{s/2}.$$

Here C is the analytic conductor of π at the central point as given by (2.4) in [H]. This new auxiliary function is holomorphic in $\Re s > -1/(m^2+1)$, and has the same features as the original choice to make the argument work out properly: it is of moderate growth in vertical strips, satisfies the functional equation (3.3) and the symmetry (3.5) in [H], and $F(0,\pi_\infty)=1$.

In fact, only a few small adjustments need to be made in the rest of the paper. First, the new notation turns (3.14) into

$$2C^{-s/2}F(s,\pi_\infty)-1\ll_\sigma \big(1+|s|\big)^{md\sigma},\quad \Re s=\sigma.$$

Correspondingly, (3.22) should read

$$\pi^{mds}\frac{L\left(\frac{1}{2}+s,\pi_\infty\right)}{L\left(\frac{1}{2}-s,\tilde{\pi}_\infty\right)}\ll_{\sigma,m,d}\left(\frac{\pi^{md}C}{N}\right)^\sigma |s|^{md\sigma},\quad \Re s=\sigma.$$

Second, all 4 occurrences of $C^{-it/2}F(it,\pi_\infty)$ on page 931 should be replaced by $2C^{-it/2}F(it,\pi_\infty)-1$. Correspondingly, (4.8) becomes

$$i\Re\sum_{j=1}^{md}\left\{\frac{\Gamma'}{\Gamma}\left(\frac{1}{4}+\frac{\mu_j}{2}+\frac{it}{2}\right)-\log\left(\frac{1}{4}+\frac{\mu_j}{2}\right)\right\}.$$

Finally, I take the opportunity to record a misprint in [H]. Formula (2.3) should read

$$L(s,\pi_\infty)=\prod_{j=1}^{md}\pi^{-(s+\mu_j)/2}\Gamma\left(\frac{s+\mu_j}{2}\right),\quad L(s,\tilde{\pi}_\infty)=\prod_{j=1}^{md}\pi^{-(s+\overline{\mu}_j)/2}\Gamma\left(\frac{s+\overline{\mu}_j}{2}\right).$$

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References

[H] G. Harcos, *Uniform approximate functional equation for principal L-functions*, Int. Math. Res. Not. **2002**, 923–932.

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