CORRECTIONS TO "ON QUANTUM UNIQUE ERGODICITY FOR $\Gamma\backslash H \times H$"

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We note that $(**)$ on page 920 of [1], as well as its derivation on page 921, has a sign error. In fact, and this will actually be useful for us later, one can in addition improve the error estimate: as we shall show for $-N \leq l, m, k, t \leq N$ with $N < r_1/2$

$$\langle f\phi_{2l,2m}, \phi_{2k,2t}\rangle = \langle f\phi_{2l+2,2m}, \phi_{2k+2,2t}\rangle + O_f(r_1^{-1}). \qquad (**')$$

The original estimate $O_f(Nr_1^{-1})$ for the error term can be obtained by simply correcting signs in the calculation on the top of page 921 of [1]; the same idea, but with slightly more careful analysis gives $(**')$. Without loss of generality $|l-k| \leq N_0$ (otherwise both sides of $(**')$ are 0), and

$$\begin{aligned}
\langle f\phi_{2l,2m}, \phi_{2k,2t}\rangle &= \frac{1}{(ir_1-2l-1)(-ir_1-2k-1)}\langle fE_1^-\phi_{2l+2,2m}, E_1^-\phi_{2k+2,2t}\rangle \\
&= \frac{1}{(ir_1-2l-1)(-ir_1-2k-1)}(\langle E_1^-(f\phi_{2l+2,2m}), E_1^-\phi_{2k+2,2t}\rangle \\
&\quad - \langle E_1^-(f)\phi_{2l+2,2m}, E_1^-\phi_{2k+2,2t}\rangle) \\
&= -\frac{1}{(ir_1-2l-1)(-ir_1-2k-1)}(\langle f\phi_{2l+2,2m}, E_1^+E_1^-\phi_{2k+2,2t}\rangle - O_f(r_1)) \\
&= -\frac{(-ir_1+2k+1)(-ir_1-2k-1)}{(ir_1-2l-1)(-ir_1-2k-1)}\langle f\phi_{2l+2,2m}, \phi_{2k+2,2t}\rangle + O_f(r_1^{-1}) \\
&= \langle f\phi_{2l+2,2m}, \phi_{2k+2,2t}\rangle + O_f(|k-l|\, r_1^{-1}) + O_f(r_1^{-1}) \\
&= \langle f\phi_{2l+2,2m}, \phi_{2k+2,2t}\rangle + O_f(r_1^{-1}).
\end{aligned}$$

This calculation needs to be iterated N times, and not N_0 times as claimed on page 921, which does indeed give

$$\langle f\phi_{2l,2m}, \phi_{2k,2t}\rangle = \langle f\phi_{2l-2k,2m-2t}, \phi_{0,0}\rangle + O_f(N\max(r_1^{-1}, r_2^{-1})),$$

as stated in [1], page 921.

The proof now proceeds as written, with the obvious typo corrected in the formula for Fejer summation: the coefficients of the sum should

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be $\frac{(2N-2|l|+1)(2N-2|m|+1)}{(2N+1)^2}$. Notice that in the same formula the summation is effectively over $|l|, |m| \leq N_0$, and so since the sum is of fixed length the error term remains unchanged.

References

[1] E. Lindenstrauss. On quantum unique ergodicity for $\Gamma \backslash H \times H$. *IMRN*, 17:913–933, 2001.

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