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K-theory for the C^*-algebras of the Discrete Heisenberg Group

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Preliminaries

By the discrete Heisenberg group we mean the group G defined as that of the following matrices;

$$G=\left\{\begin{bmatrix}1 & m & l\\ 0 & 1 & k\\ 0 & 0 & 1\end{bmatrix}; k, l, m\in \boldsymbol{Z}\right\}.$$

We take two closed subgroups M and N of G as follows;

$$M=\left\{\begin{bmatrix}1 & m & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix}; m\in \boldsymbol{Z}\right\}$$

and

$$N=\left\{\begin{bmatrix}1 & 0 & l\\ 0 & 1 & k\\ 0 & 0 & 1\end{bmatrix}; k, l\in \boldsymbol{Z}\right\}.$$

It is clear that $M\cong \boldsymbol{Z}$, $N\cong \boldsymbol{Z}^2$, so that we may identify M with $\boldsymbol{Z}$ and N with $\boldsymbol{Z}^2$. An action of M on N is defined by

$$m\cdot z=mzm^{-1}=(k, l+mk)$$

for $m\in M$ and $z=(k, l)\in N$. Then G is isomorphic to the semidirect product $N\times_s M$ of N by M with the multiplication

$$(z, m)(z', m')=(z+m\cdot z', m+m')$$

for (z, m) and $(z', m')\in N\times_s M$. Thererfore we identify G with $\boldsymbol{Z}^2\times_s \boldsymbol{Z}$

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