

$$\begin{array}{ccc}
 G & R[G] \xrightarrow{\psi_G^*} S[G] & \sum_{g \in G} a_g g \mapsto \sum_{g \in G} \psi(a_g) g \\
 \downarrow \varphi & \downarrow R(\varphi) \qquad \downarrow S(\varphi) & \downarrow \qquad \qquad \downarrow \\
 H & R[H] \xrightarrow{\psi_H^*} S[H] & \sum_{g \in G} a_g \varphi(g) \mapsto \sum_{g \in G} \psi(a_g) \varphi(g)
 \end{array}$$