

$$\mathbb{O}=\mathbb{H}+\ell\mathbb{H}$$

$$x+\ell y \in \mathbb{O} \rightharpoonup {}_2\mathbb{H}^2 \ni \left.\begin{array}{c|c} x & y \\ -y^* & x^* \end{array}\right.$$

$$\underline{x+\ell y}\,\underline{u+\ell v} = \left.\begin{array}{c|c} x & y \\ -y^* & x^* \end{array}\right. \left.\begin{array}{c|c} u & v \\ -v^* & u^* \end{array}\right. = \underline{xu-yv^*} + \ell \underline{xv+yu^*}$$