

$$\mathbb{H}_w\bigcup_0\mathbb{C}_\alpha$$

$$\alpha=|\mathbb{C}_\alpha^1|$$

$$w_1I+w_2J+w_3K\text{ cx structure}$$

$$w_1^2+w_2^2+w_3^2=1$$

$$w\in \mathbb{S}^2$$

$$\alpha\!:\!w\in\mathbb{R}^3/\mathbb{Z}_2$$