Lattices from Maximal Quaternion Orders with Full Diversity

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- **Poster proposal:**

Construct ideal lattices on totally real number fields (full diversity) and with good center density by using a maximal order in a quaternion algebra. Those lattices may be suitable for signal transmission over both Gaussian and Rayleigh fading channels.

Let $\mathcal{I}$ be an ideal in a maximal quaternion order $\mathcal{M}$ of the quaternion algebra $\mathcal{A}$ over a totally real algebraic number field $\mathbb{K}$. Let α be a totally positive element in $\mathbb{K}$. Then $(\mathcal{I}, \alpha)$ is an *ideal lattice* with rank $4n$, $n > 1$ and full diversity.

Our objective is to find a suitable ideal $\mathcal{I}$ and element α such that the ideal lattice $(\mathcal{I}, \alpha)$ is isomorphic to known lattices of rank $4n$.

$$D_4,\ E_8,\ K_{12},\ \Lambda_{16},\ \Lambda_{24}, \cdots$$

THANK YOU!