Mutually Unbiased Bases

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Two orthogonal bases $A$ and $B$ of an $n$-dimensional Hilbert space are called *Mutually Unbiased* if for $a_i \in A$ and $b_j \in B$ holds: $|(a_i, b_j)|^2 = \frac{1}{n}$ for each $i, j \in \{1, \ldots, n\}$. A set $\mathcal{B}$ of Mutually Unbiased Bases (MUBs) is a set of bases such that each two distinct bases $B_i, B_j \in \mathcal{B}$ are mutually unbiased.

The bounds on the number of MUBs, dependent on the dimension $n$, will be derived. Also a construction for MUBs in $\mathbb{C}^p$, with $p$ prime, will be showed. Finally, some open problems will be discussed.