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ABSTRACT

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Linear combinations of projections and perturbations of operators in von Neumann factors Abstract:

We present recent results of the following type: For any hermitian operator $a \in \mathcal{M}$, $a \in \lim(p_1, \ldots, p_n)$ for some projections $p_1, \ldots, p_n \in \mathcal{M}$; for some hermitian operator $a \in \mathcal{M}$, $a \notin \lim(p_1, \ldots, p_{n-1})$ for any projections $p_1, \ldots, p_{n-1} \in \mathcal{M}$. If proves that n = 4 for \mathcal{M} being a factor of type I_n , n > 76; I_∞ ; II_1 or II_∞ but n = 3 for \mathcal{M} of type III.

Similar methods gives results of type: If hermitian operators H_1 , H_{-1} satisfies $||H_{+1}|| > 1$ and some conditions in spectral language, then for any operator $0 \leq H \leq 2 \cdot 1$ we have $(H_1 + H'_{-1})^+ = H'$ for some $H'_{-1} \sim H_{-1}$, $H \sim H'$. The equivalence relation $H \sim H'$ means that $H' = uHu^*$ for some partial isometry u in \mathcal{M} .

Some new look at old methods in perturbations theory of operator in Hilbert space will also be presented.