# Seminário CEAFEL*

## 5 de Junho – 15:00 - sala 6.2.38

# Lattices of invariant subspaces

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Abstract:
Given $\mathbb{F}$ an arbitrary field and $A \in M_n(\mathbb{F})$, the set of $A-$invariant subspaces of $\mathbb{F}^n$ is a lattice with inclusion as order, intersection as meet and linear sum as join. We denote this lattice by $\text{Inv}(A)$. An $A-$invariant subspace $V \subseteq \mathbb{F}^n$ is $A-$hyperinvariant ($A$-characteristitc) if it is invariant for every matrix $T \in Z(A)$, i.e. commuting with $A$ ($T \in Z^*(A)$, i.e. commuting with $A$ and $T$ non singular). It is straightforward to see that the set of $A-$hyperinvariant ($A-$characteristic) subspaces is a sublattice of $\text{Inv}(A)$. We denote this sublattice by $\text{Hinv}(A)$ ($\text{Chinv}(A)$). Obviously,

$$\text{Hinv}(A) \subseteq \text{Chinv}(A) \subseteq \text{Inv}(A).$$

If the characteristic polynomial of $A$ splits over $\mathbb{F}$, the study of these lattices can be reduced to the nilpotent case.

Let $J \in M_n(\mathbb{F})$ be a nilpotent Jordan matrix. In this talk we recall the general properties of $\text{Inv}(J)$ and analyze which of those properties are preserved in the sublattice $\text{Hinv}(J)$ and, if $\mathbb{F} = GF(2)$, in $\text{Chinv}(A)$ (the only case where $\text{Hinv}(J) \neq \text{Chinv}(J)$).

In addition we analyze the cardinality of $\text{Hinv}(J)$ and $\text{Chinv}(J)$.

**Joint work with** David Mingueza[1], M. Eulàlia Montoro[2]

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