On the Number of Gradings on Matrix Algebras

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In this talk we determine the number of isomorphism classes of elementary gradings by a finite group on an algebra of upper block-triangular matrices. As a consequence we prove that, for a finite abelian group G, the sequence of the numbers $E(G, m)$ of isomorphism classes of elementary G-gradings on the algebra $M_m(\mathbb{F})$ of $m \times m$ matrices with entries in a field $\mathbb{F}$ characterizes G. A formula for the number of isomorphism classes of gradings by a finite abelian group on an algebra of upper block-triangular matrices over an algebraically closed field, with mild restrictions on its characteristic, is also provided. Finally, if G is a finite abelian group, $\mathbb{F}$ is an algebraically closed field and $N(G, m)$ is the number of isomorphism classes of G-gradings on $M_m(\mathbb{F})$ we prove that $N(G, m) \sim \frac{1}{|G|!} m^{|G|-1} \sim E(G, m)$. These results were obtained in [1] in collaboration with Daniel Pellegrino.

References

[1] D. Diniz, D. Pellegrino, *On the number of gradings on matrix algebras*, Linear Algebra and its Applications **624** (2021) 14–26.