UPPER BOUND FOR DIMENSION OF HILBERT CUBES CONTAINED IN QUADRATIC RESIDUES

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ABSTRACT. We consider the problem of bounding the dimension of Hilbert cubes that do not contain primitive roots, in a finite field $\mathbb{F}_p$. We show the dimension of such Hilbert cubes is $O_\varepsilon(p^{1/8+\varepsilon})$ for any $\varepsilon > 0$, matching what can be deduced from the classical Burgess estimate in the special case when the Hilbert cube is an arithmetic progression.