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Extension theorems for paraboloids in the finite field setting

We study the $L^p - L^r$ boundedness of the extension operators associated with paraboloids in vector spaces over finite fields. We estimate the number of additive quadruples in the subset of the paraboloids. As a result, in higher dimensions, we improve upon the standard Stein-Tomas exponents. The discrete Fourier analytic machinery and Gauss sum estimates make an important role in the proof.