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Burgess-type character sum estimates over generalized arithmetic progressions of rank 2.

We extend the classical Burgess estimates to character sums over proper generalized arithmetic progressions (GAPs) of rank 2 in prime fields. The core of our proof is a sharp upper bound for the multiplicative energy of these sets, established by adapting an argument of Konyagin and leveraging tools from the geometry of numbers. This is joint work with Xuancheng Shao.