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Supercharacters and Mixed Moments of Kloosterman Sums.

Recent work has expressed many exponential sums as values of various supercharacter theories arising from the action of subgroups of $GL_d(\mathbb{Z}/n\mathbb{Z})$ on $(\mathbb{Z}/n\mathbb{Z})^d$. We investigate the supercharacter theory arising from the action of $GL_2(\mathbb{F}_p)$ on $(\mathbb{F}_p)^2$ whose values correspond to Kloosterman sums. We then use the resulting supercharacter table and a result of Williams to express fourth degree mixed Kloosterman moments in terms of the trace of Frobenius of an elliptic curve. (Received September 27, 2017)