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A Generalized Weil Representation for the Finite Split Orthogonal Group $\mathrm{O}_q(2n, 2n)$, q odd > 3

We construct via generators and relations a generalized Weil representation for the split orthogonal group $\mathrm{O}_q(2n, 2n)$ over a finite field of q elements. Besides, we give an initial decomposition of the representation found. We also show that the constructed representation is equal to the restriction of the Weil representation to $\mathrm{O}_q(2n, 2n)$ for the reductive dual pair $(\mathrm{Sp}_2(\mathbb{F}_q), \mathrm{O}_q(2n, 2n))$ and that the initial decomposition is the same as the decomposition with respect to the action of $\mathrm{Sp}_2(\mathbb{F}_q)$.

Keywords: Weil representation, split orthogonal group, involutive analogues of classical groups.

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