

Defect Covariance in State-Level Gauging

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Verdict: scope-restriction (open).

1 Source statement

The modified-fusion lemma of Ref. [FRBC25, lines 4215–4326] constructs unitary fusion operators from locally orthogonal matrix-product-state blocks. The resulting modified Gauss operators leave the gauged state invariant [FRBC25, lines 4327–4335]. Thus the paper derives the local defect support and covariance used in the invariance argument from its concrete defect tensors and fusion maps.

2 Current formal scope

The present universal-vector theorem starts with defect subspaces $\mathcal{K}_{a,b}$, prescribed maps $D_{a,b}$, and matter states $|\Psi_\alpha\rangle$. It assumes that every two-site matter slice lies in the corresponding defect subspace and that, for every window and $g \in G$,

$$(D_{a,b} \otimes \mathbb{1})|\Psi_\alpha\rangle = (D_{ag^{-1},gb} \otimes \mathbb{1})|\Psi_{T_{j,g}\alpha}\rangle. \quad (1)$$

Under these hypotheses it proves invariance for every unitary completion of the prescribed maps. This is a conditional abstraction of the paper’s argument, not yet a derivation of the hypotheses from locally orthogonal MPS blocks.

3 Elimination plan

To recover the full source construction, instantiate the defect subspaces, prescribed maps, and matter states from the FBC25 defect tensors; prove local support and the displayed covariance from local orthogonality and the modified fusion lemma; then specialize the abstract universal-vector theorem. The four-domain CZX instance and this source-to-abstraction bridge remain tracked by GitHub issue #7569.

References

- [FRBC25] Adrián Franco Rubio, Arkadiusz Bochniak, and J. Ignacio Cirac. Symmetry defects and gauging for quantum states with matrix product unitary symmetries, 2025.