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Lattice Weyl Fermion on a single spherical domain-wall 2

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We discuss a single domain-wall system with a nontrivial curved background by considering a massive fermion on a 3D square lattice, where the domain-wall is a 2D sphere. In the presence of a topologically nontrivial U(1) link gauge field, we observe the emergence of a zero mode with opposite chirality localized at the center where the gauge field is singular. This results in the low-energy effective theory becoming vectorlike rather than chiral. We also discuss how to circumvent this obstacle in formulating lattice chiral gauge theory in the single domain-wall fermion system.

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