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Isovector Axial Charge with Current Improvement

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We employ dimension 4 operators to improve the local vector and axial vector currents, as the leading order approximation of the lattice conserved current, and then calculate the nucleon iso-vector axial coupling g_A^3 using overlap valence on Domain Wall Fermion sea. Using the equality of g_A^3 from A_i and A_4 components of the axial-vector current as a normalization condition in addition to axial Ward identity, we find two to three percent increase of g_A^3 towards the experimental value. The excited state contamination has been taken into account with three time separations between the source and sink. The improved axial charges $g_A^{IM}(24I) = 1.188(7)$, $g_A^{IM}(32I) = 1.177(9)$ are obtained on $24^3 \times 64$ and $32^3 \times 64$ lattices at the unitary point where the pion masses are 330 MeV and 300 MeV respectively.

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