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O(a) improvement of the flavour singlet scalar density in a setup with Wilson fermions

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We report on our Ward identity determination of the O(a) improvement coefficient for the flavour singlet scalar density, namely g_S , from three-flavour lattice QCD with Wilson-clover fermions and the tree-level Symanzik improved gauge action. We employ five couplings, $g_0^2 \in [1.5, 1.77]$, that cover the range used in large-volume CLS simulations.

While $g_{\rm S}$ itself is for instance relevant for the ${\rm O}(a)$ improvement of meson and baryon sigma terms, a relation to $b_{\rm g}$, the ${\rm O}(a)$ improvement parameter of the gauge coupling, can also be established, allowing for its non-perturbative extraction as well. With Wilson fermions, $b_{\rm g}$ is in principle required for full ${\rm O}(a)$ improvement at non-vanishing sea quark masses. We outline our procedure for extracting $b_{\rm g}$.

Primary author: PETRAK, Pia Leonie Jones (University of Münster)

Co-authors: VLADIKAS, Anastassios (INFN, Roma "Tor Vergata"); JOSWIG, Fabian (University of Edinburgh); HEITGER, Jochen (University of Muenster, ITP)

Presenter: PETRAK, Pia Leonie Jones (University of Münster)

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