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

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