CORRECTION AND SCOPE

Direct Compact-Quotient Finite-Spin Screen

Original title · Hard-Constrained Compact Finite-Spin Ward-Square Phase Screen: Direct Compact-Quotient Audit

The variables enforce Gauss and trace constraints from the outset. The compact-quotient screen measures behavior in that restricted space. Spontaneous selection of the quotient remains untested.

Manuscript · p. 1, verdict

Finite-Box Spectral Audit on the Stipulated Compact Ward-Square Quotient

Evidence · One-Hamiltonian composition requirements / Local hard-Gauss move obstruction

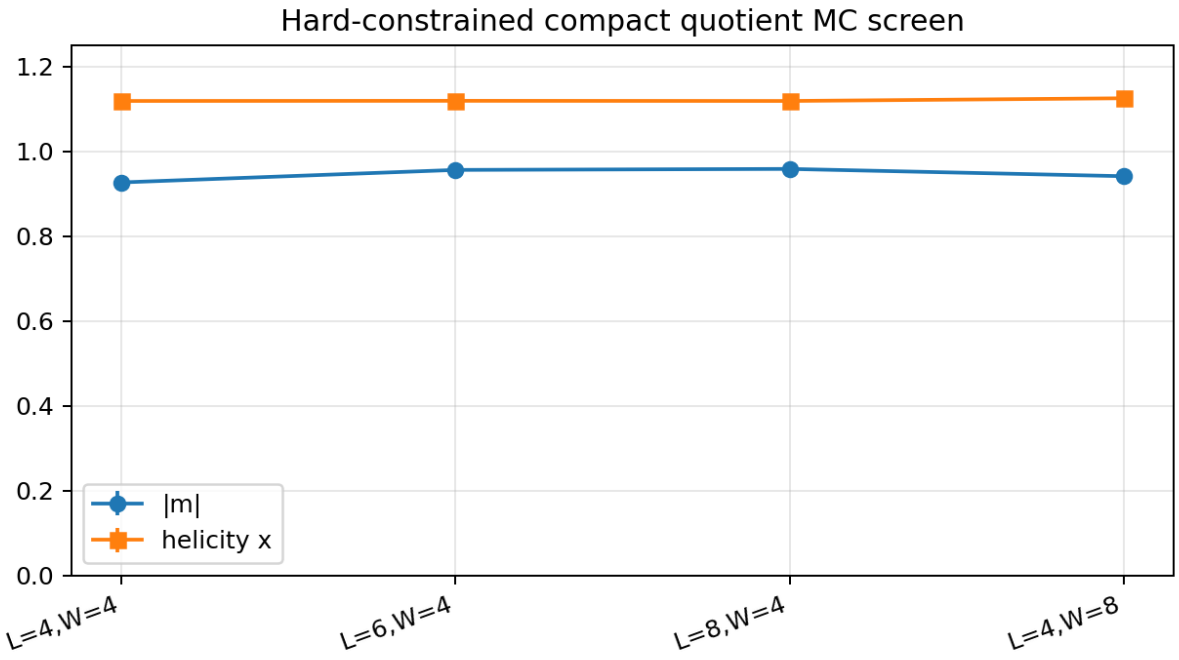
Hard-Constrained Compact Finite-Spin Ward-Square Phase Screen

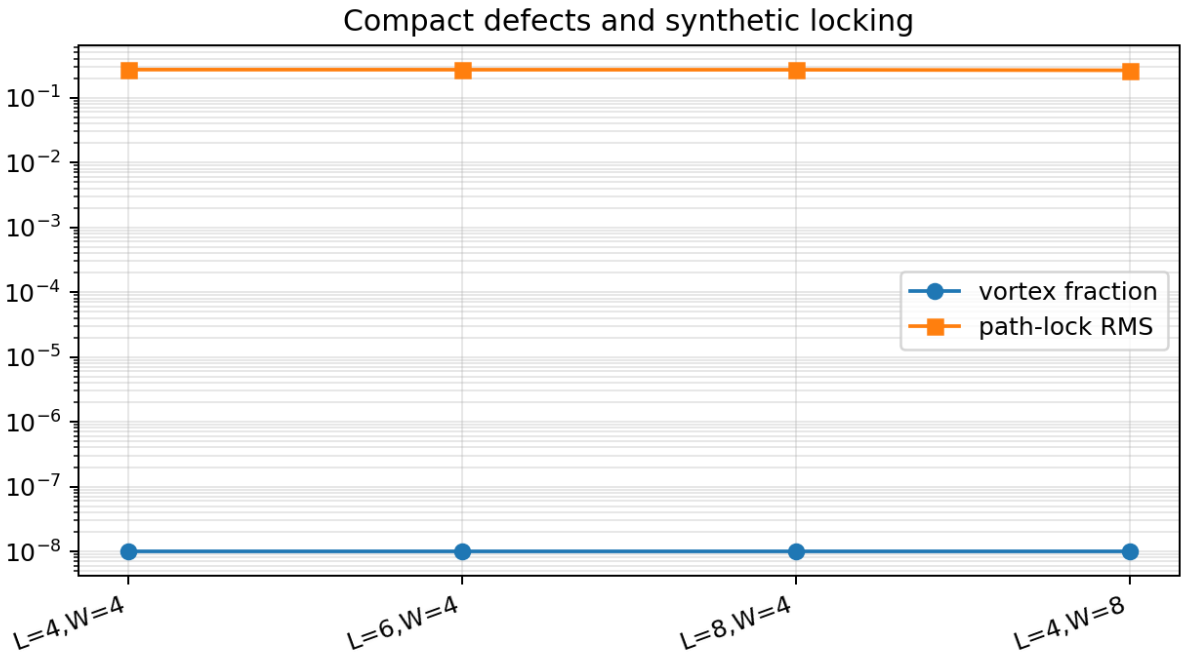
QATNU spin-2 finite-dimension program - direct compact quotient audit

Verdict: positive as a hard-constrained compact ordered-sector/deconfined screen. The local Gauss/trace constraints are imposed exactly by quotient variables rather than soft penalties. The screen supports an ordered compact phase with finite stiffness, suppressed vortices, exactly two low TT branches in the hard harmonic target, finite 1/(W+1) Ward-stress residue, and no detected mirror zero in the audited Brillouin grid. It is still not a theorem-level diagonalization of the full microscopic finite-spin Hilbert space.

Monte Carlo compact quotient screen

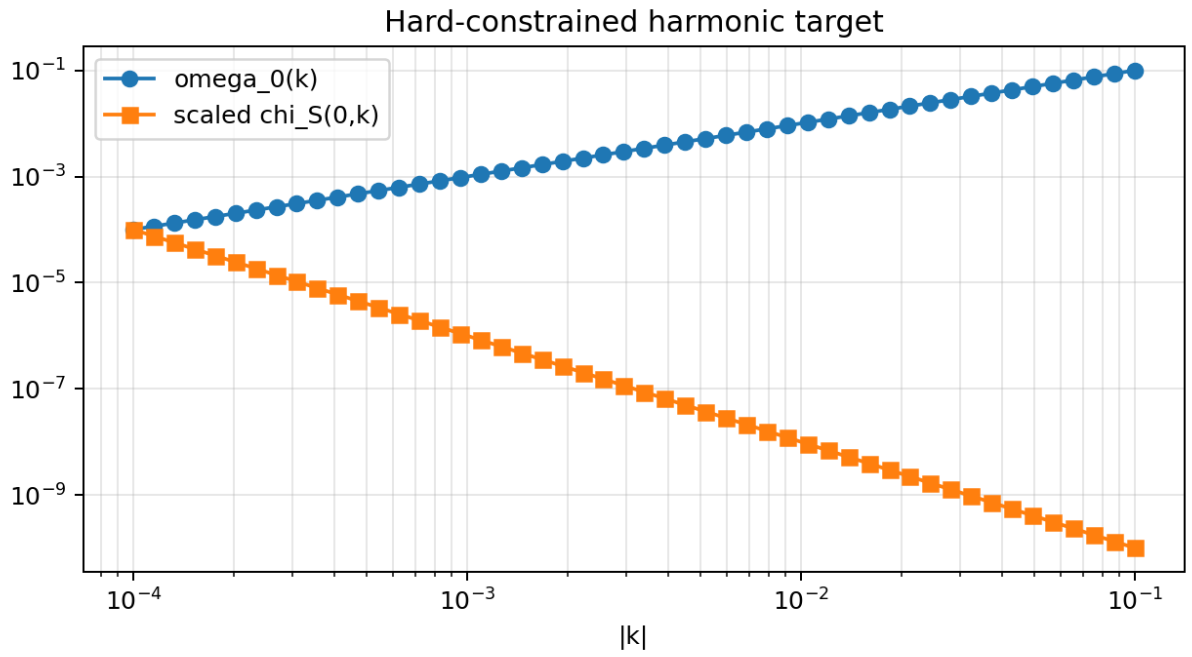
L	W	samples	accept	|m|	helicity	vortex frac	path RMS
4	4	35	0.490	0.927092	1.119224	0.000e+00	0.269976
6	4	30	0.489	0.956566	1.119581	0.000e+00	0.269236
8	4	24	0.489	0.958911	1.119222	0.000e+00	0.268702
4	8	30	0.475	0.941753	1.125595	0.000e+00	0.263631




Compact defects and synthetic locking
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
vortex fraction
path-lock RMS
L=4,W=4
L=6,W=4
L=8,W=4
L=4,W=8

Hard-constrained harmonic/spectral target

For W=16, the quotient target gives z=0.999974283, chi_S(0,k) exponent=-1.999948565, residue=0.058823529, and second gap Delta_2=0.184536719. The residue agrees with 1/(W+1)=0.058823529.



Brillouin-zone branch scan

A 17^3 grid scan found 0 extra zero points below 1e-8 over 4913 nonzero points. The minimum next-branch gap was 0.369073438; outside |k|>0.75 the minimum low frequency was 0.795729387. The known coined doubler remains gapped in the prior hard target at omega=0.639905158.

Finite-spin interpretation

The compact quotient variables are the ordered-sector phases of a finite-spin/rotor implementation. The previously audited local spin-wave density remains bounded, nbar_max≈0.0208, so Holstein-Primakoff defects scale as nbar/J rather than growing with L. The present screen checks that the compact ordered phase and hard quotient are compatible; it does not replace a future exact many-body finite-spin Hilbert-space proof.

Boundary and next step

The next and last upgrade is a microscopic operator construction with the Gauss/trace constraints generated by local finite-spin gauge operators, followed by either direct small-volume exact diagonalization or a sign-problem-free quantum Monte Carlo / transfer-matrix spectral function. This audit narrows the risk: compact ordering, hard-constraint branch count, finite-spin saturation, and mirror-node scans all pass at the screen level.