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Computation time

Total	None
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Experimental condition

Type of tomography	StandardQst
Nrep	100
N	[100, 1000, 10000]
RNG seed	777

True object

Type	State
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Dim	2
Vec	[0.70710678 0.40824829 0.40824829 0.40824829]

Tester objects

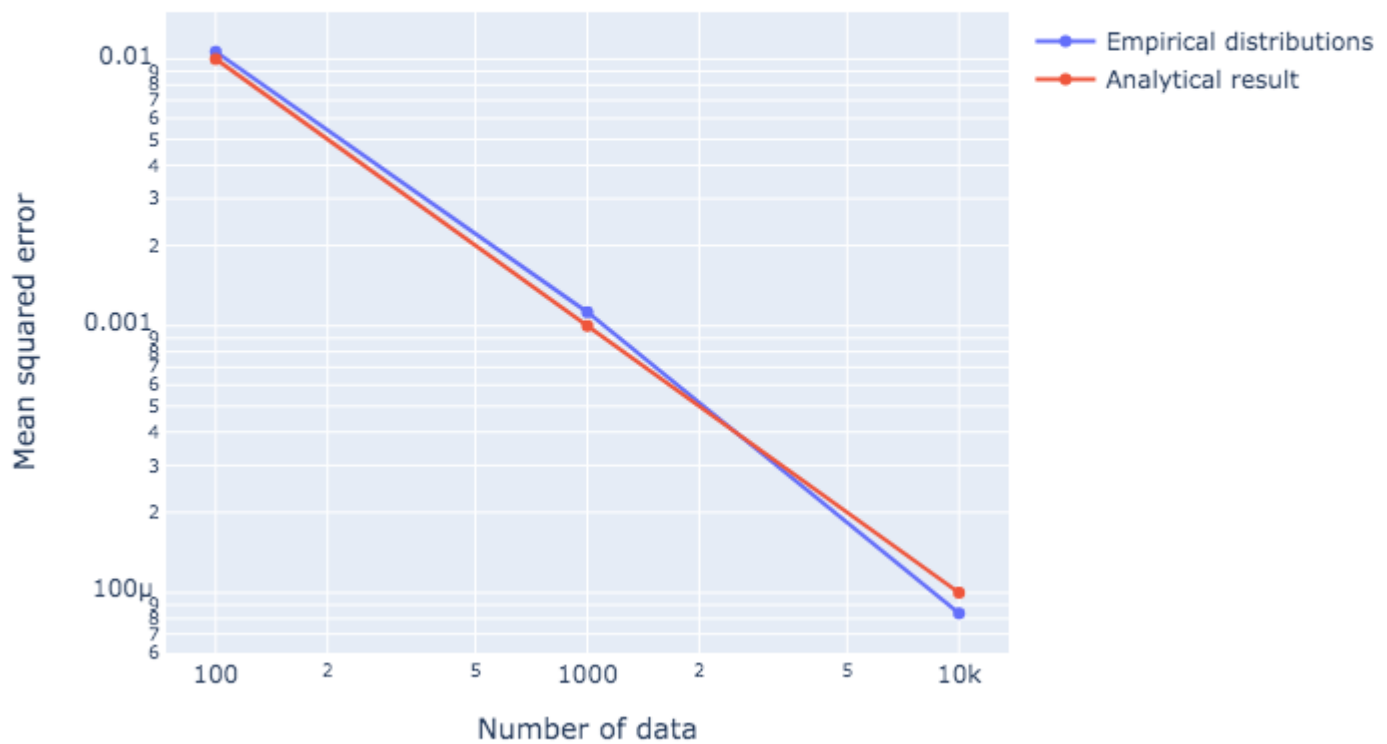
0	Type	Povm
	Dim	2
	Number of outcomes	2
	Vecs	[0.70710678 0.70710678 0. 0.] [0.70710678 -0.70710678 0. 0.]
1	Type	Povm
	Dim	2
	Number of outcomes	2
	Vecs	[0.70710678 0. 0.70710678 0.] [0.70710678 0. -0.70710678 0.]
2	Type	Povm
	Dim	2
	Number of outcomes	2
	Vecs	[0.70710678 0. 0. 0.70710678] [0.70710678 0. 0. -0.70710678]

Cases

	Name	Parameterization	Tomography	Estimator
0	LinearEstimator(True)	True	StandardQst	LinearEstimator
1	LinearEstimator(False)	False	StandardQst	LinearEstimator
2	ProjectedLinearEstimator(True)	True	StandardQst	ProjectedLinearEstimator
3	ProjectedLinearEstimator(False)	False	StandardQst	ProjectedLinearEstimator

MSE of empirical distributions

Mean squared error



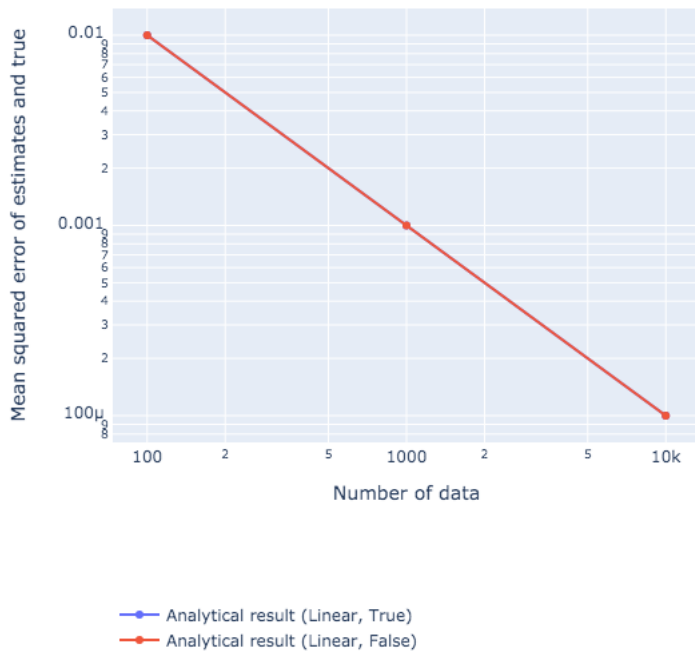
Consistency test

	Type of tomography	ParametORIZATION	Estimator	Result
0	StandardQst	True	LinearEstimator	9.244464e-33
1	StandardQst	False	LinearEstimator	5.854827e-32
2	StandardQst	True	ProjectedLinearEstimator	2.095412e-31
3	StandardQst	False	ProjectedLinearEstimator	3.050673e-31

MSE of estimators

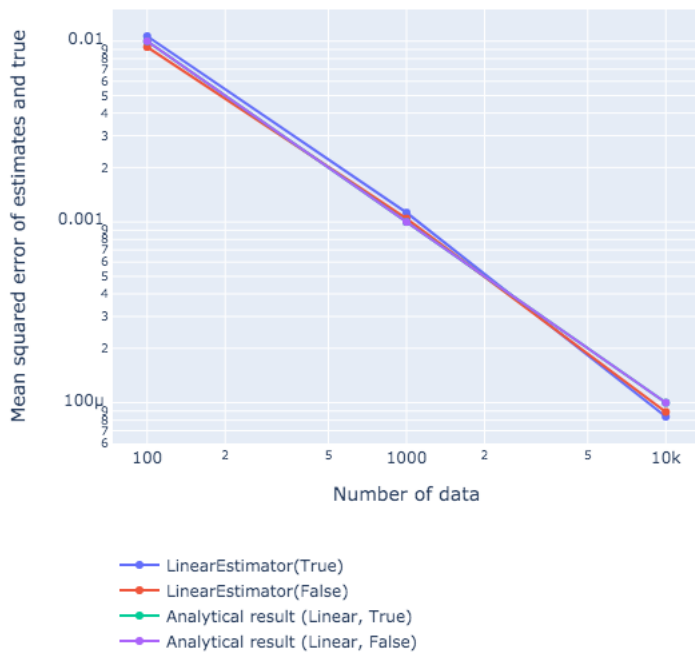
Comparison of analytical results

Mean squared error
Analytical result

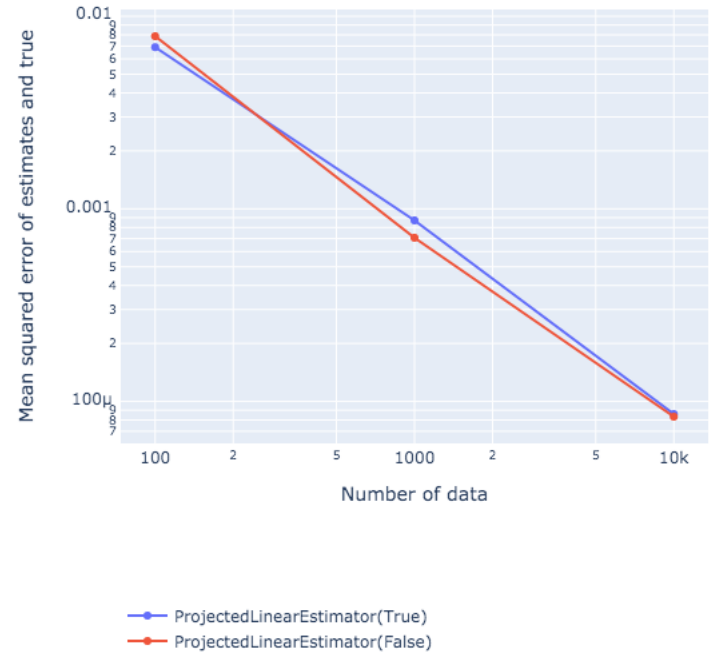


Comparison of parametrization

Mean squared error
estimator=LinearEstimator

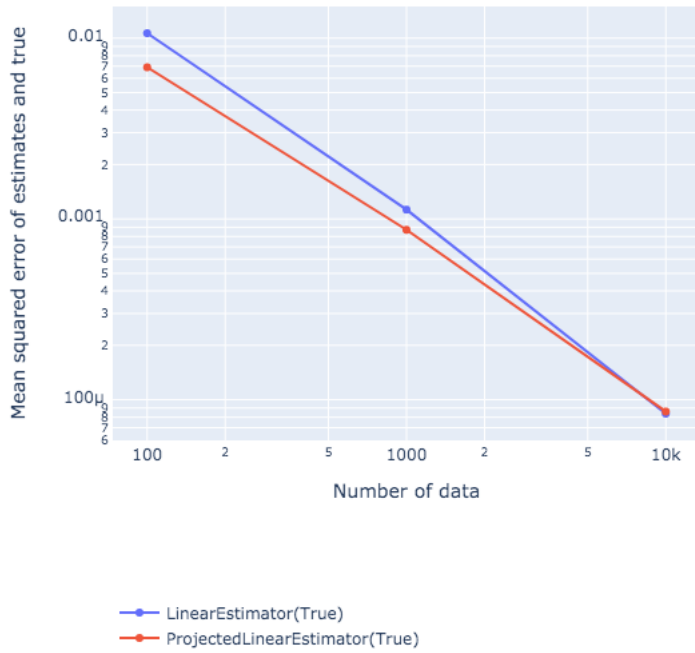


Mean squared error
estimator=ProjectedLinearEstimator

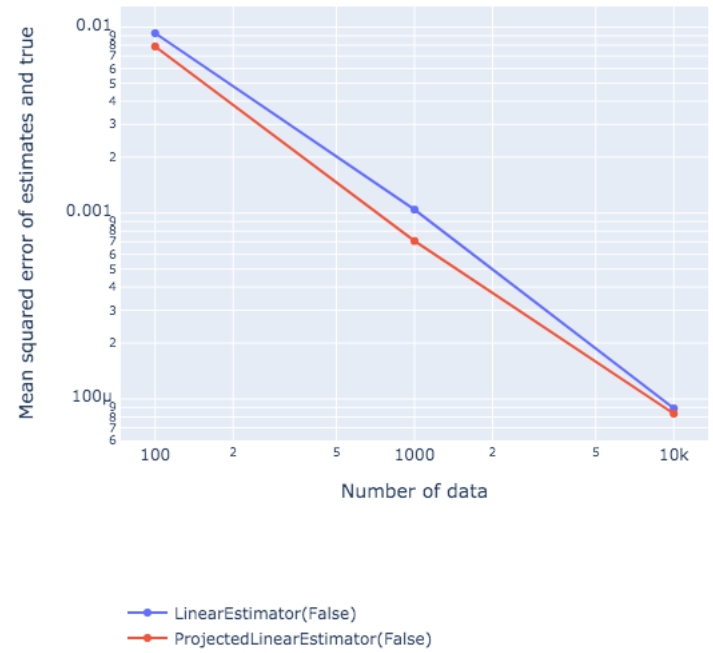


Comparison of estimators

Mean squared error
parametrization=True



Mean squared error
parametrization=False

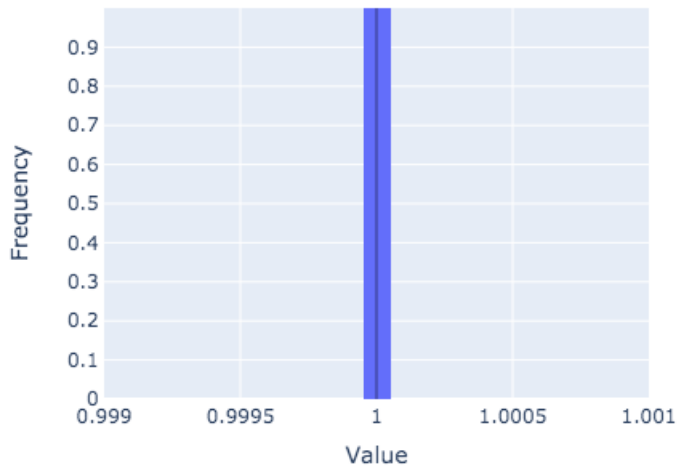


Physicality violation test

Test of equality constraint violation

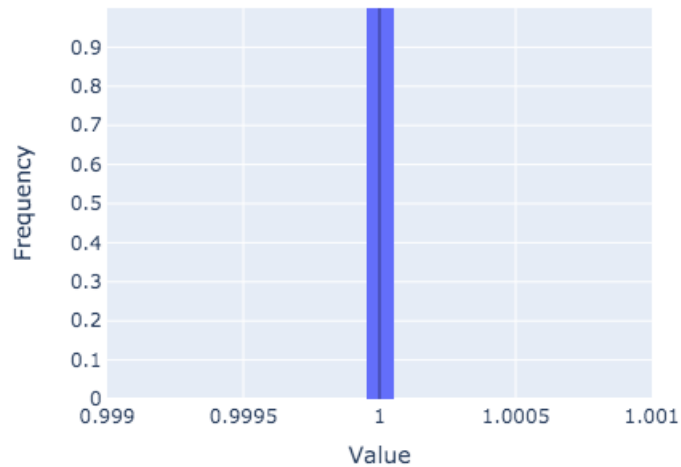
Case 0: LinearEstimator(True)

N=100, Nrep=100



Min: 0.9999999999999998
Max: 0.9999999999999998
|Max-Min|: 0.0

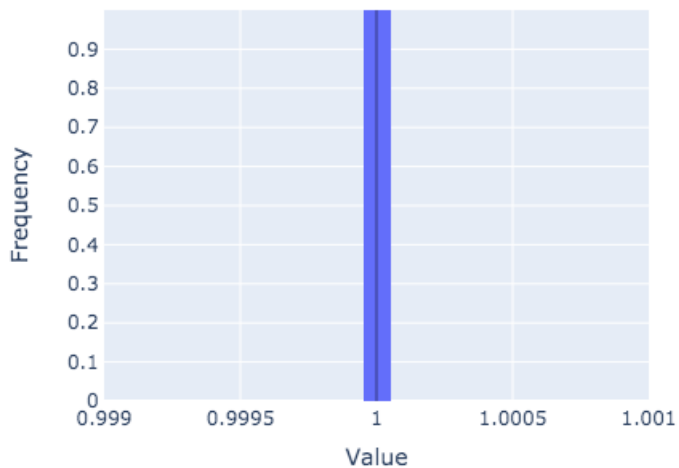
N=1000, Nrep=100



Min: 0.9999999999999998
Max: 0.9999999999999998
|Max-Min|: 0.0

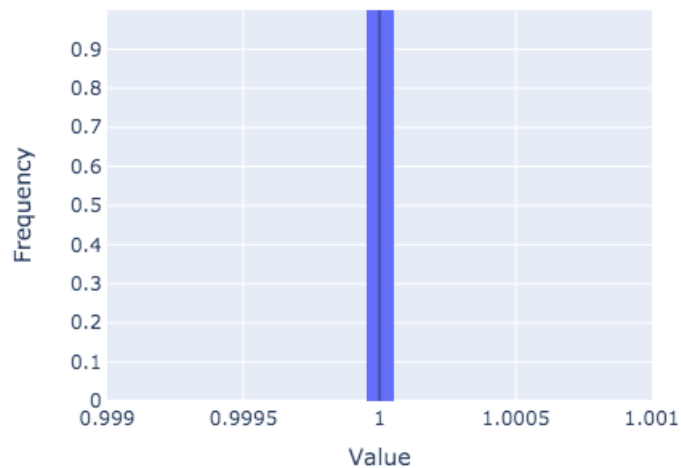
Case 1: LinearEstimator(False)

N=100, Nrep=100



Min: 0.9999999999999998
Max: 1.0000000000000002
|Max-Min|: 4.440892098500626e-16

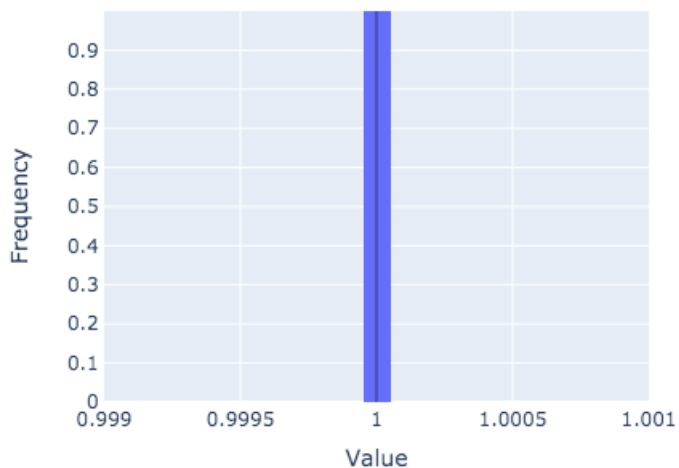
N=1000, Nrep=100



Min: 0.9999999999999998
Max: 1.0000000000000002
|Max-Min|: 4.440892098500626e-16

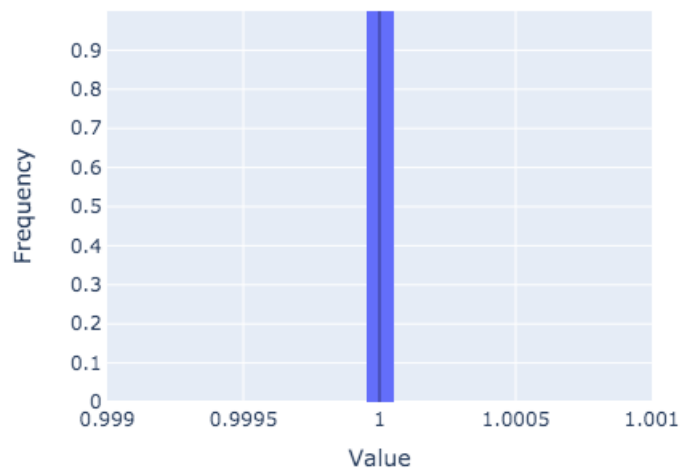
Case 2: ProjectedLinearEstimator(True)

N=100, Nrep=100



Min: 0.9999999999999998
Max: 0.9999999999999998
|Max-Min|: 0.0

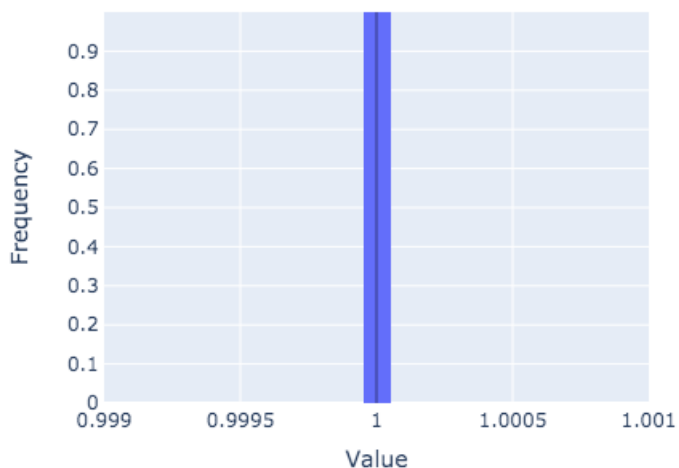
N=1000, Nrep=100



Min: 0.9999999999999998
Max: 0.9999999999999998
|Max-Min|: 0.0

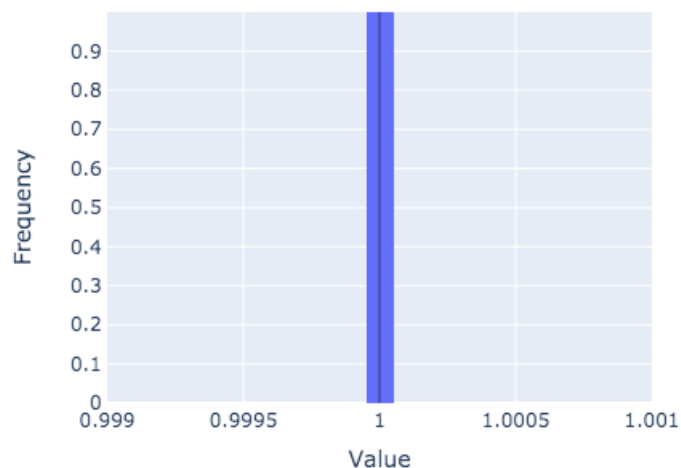
Case 3: ProjectedLinearEstimator(False)

N=100, Nrep=100



Min: 0.9999999999999998
Max: 0.9999999999999998
|Max-Min|: 0.0

N=1000, Nrep=100



Min: 0.9999999999999998
Max: 0.9999999999999998
|Max-Min|: 0.0

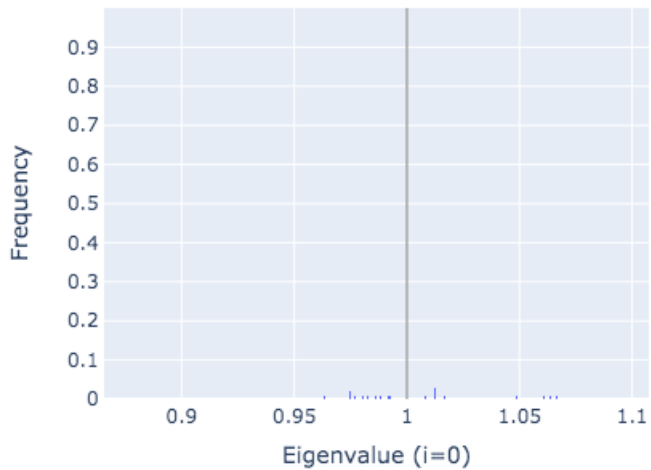
Test of inequality constraint violation

Eigenvalue

Case 0: LinearEstimator(True)

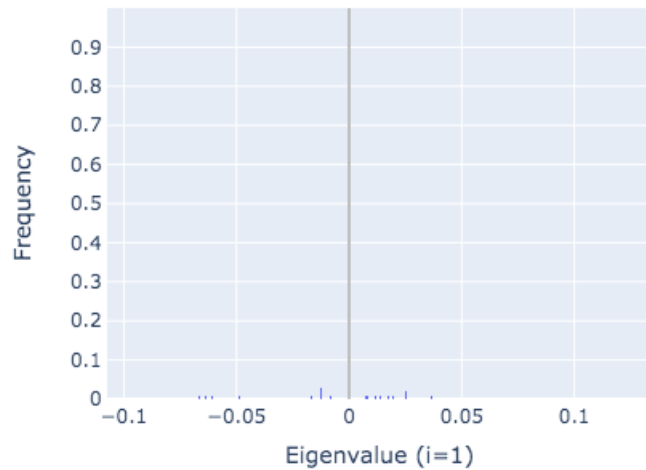
N=100

N=100, Nrep=100



Min: 0.8656501059756443
Max: 1.1073713855624088
|Max-Min|: 0.24172127958676448

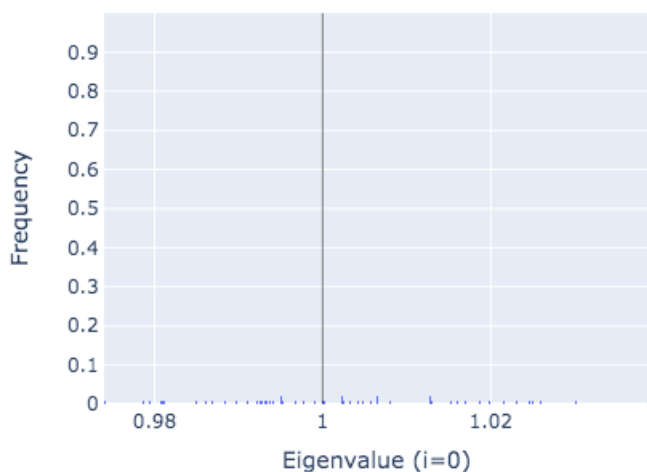
N=100, Nrep=100



Min: -0.10737138556240879
Max: 0.13434989402435554
|Max-Min|: 0.24172127958676431

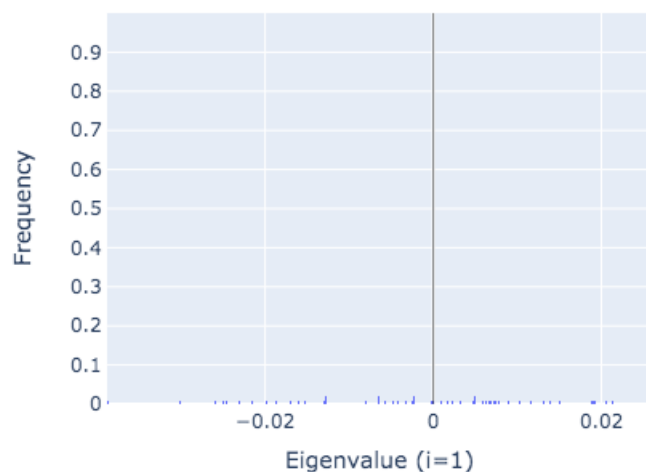
N=1000

N=1000, Nrep=100



Min: 0.974055903876326
Max: 1.038734628551015
|Max-Min|: 0.06467872467468905

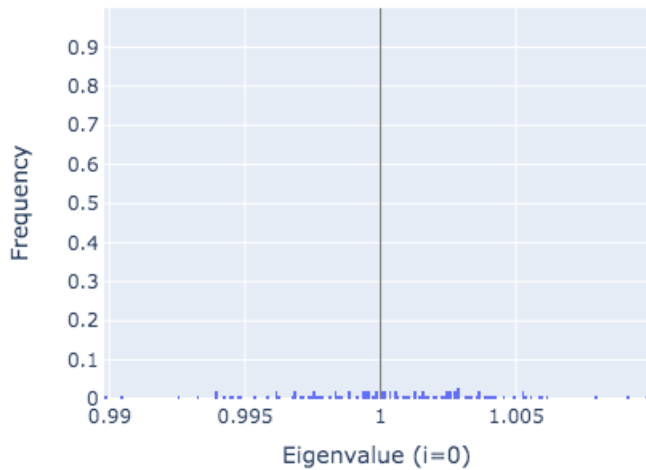
N=1000, Nrep=100



Min: -0.03873462855101516
Max: 0.025944096123674317
|Max-Min|: 0.06467872467468948

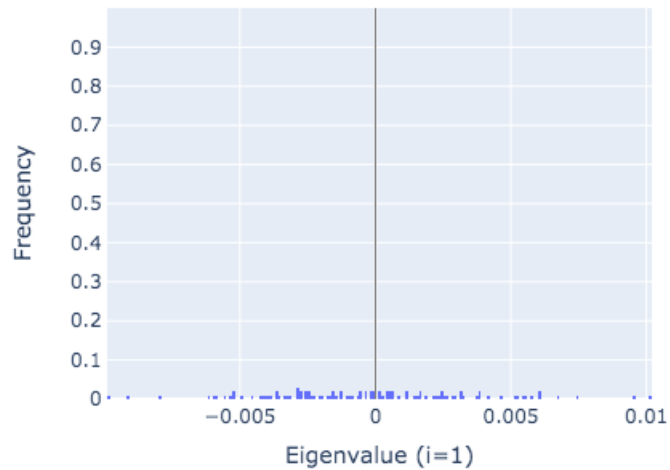
N=10000

N=10000, Nrep=100



Min: 0.9898449346476905
Max: 1.0098202428307452
|Max-Min|: 0.019975308183054707

N=10000, Nrep=100

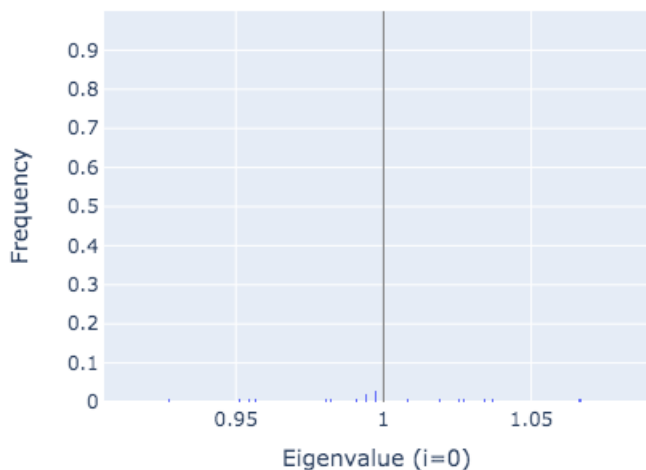


Min: -0.009820242830745339
Max: 0.010155065352309402
|Max-Min|: 0.019975308183054742

Case 1: LinearEstimator(False)

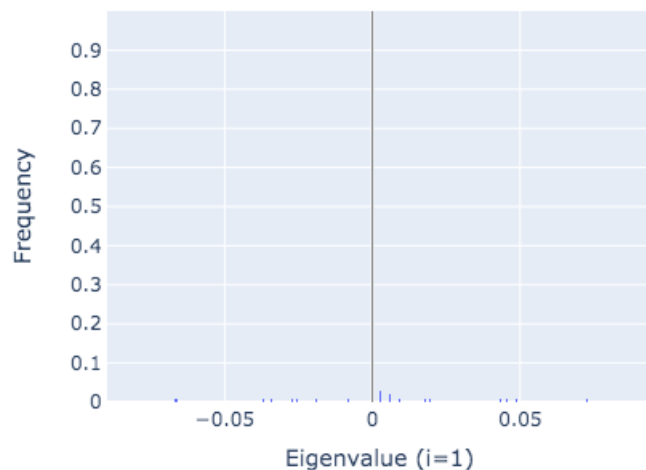
N=100

N=100, Nrep=100



Min: 0.9054626986542657
Max: 1.08974570791147
|Max-Min|: 0.18428300925720442

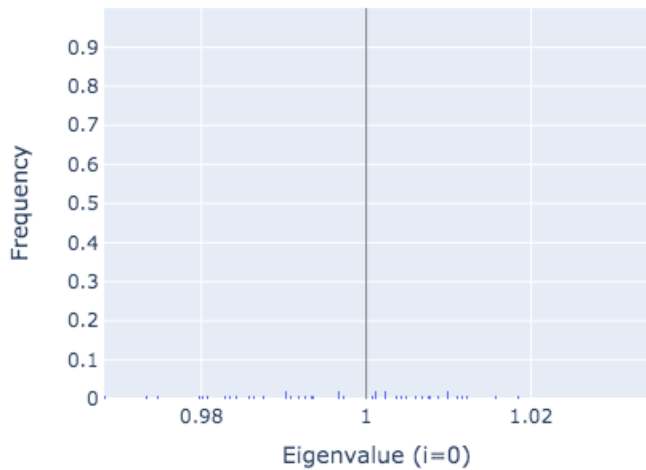
N=100, Nrep=100



Min: -0.08974570791146932
Max: 0.09453730134573403
|Max-Min|: 0.18428300925720337

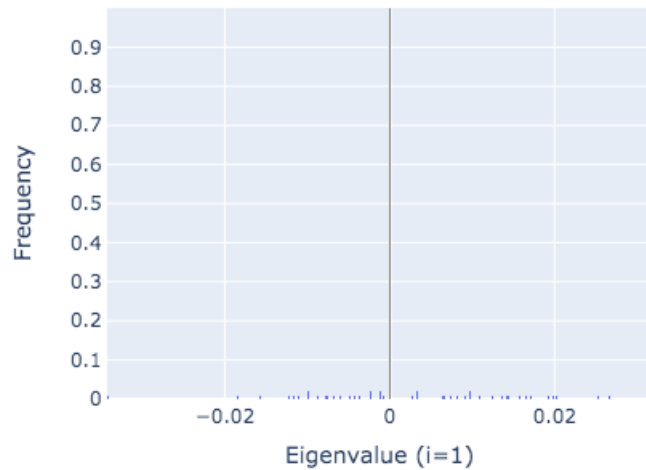
N=1000

N=1000, Nrep=100



Min: 0.9682873049742009
Max: 1.0342967340345623
|Max-Min|: 0.06600942906036145

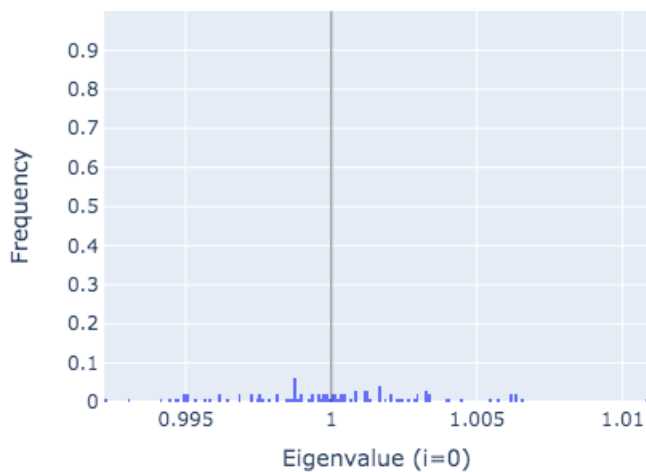
N=1000, Nrep=100



Min: -0.03429673403456271
Max: 0.03171269502579911
|Max-Min|: 0.06600942906036182

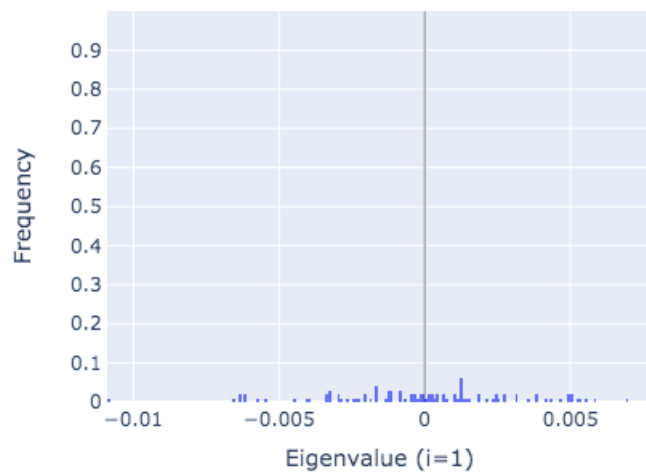
N=10000

N=10000, Nrep=100



Min: 0.9922677015608485
Max: 1.0108647570541545
|Max-Min|: 0.018597055493305925

N=10000, Nrep=100

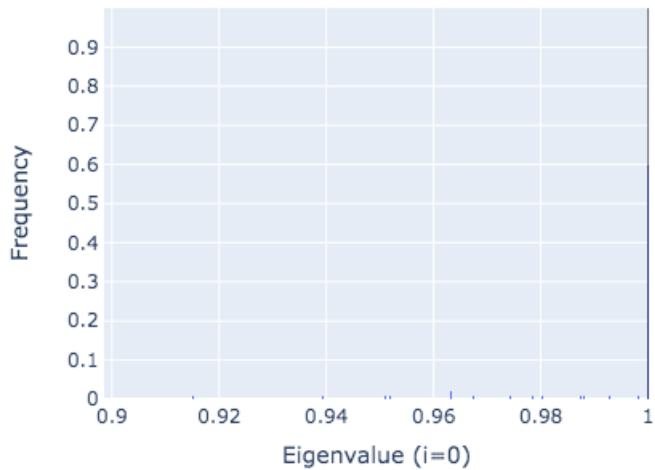


Min: -0.010864757054154343
Max: 0.00773229843915209
|Max-Min|: 0.01859705549330643

Case 2: ProjectedLinearEstimator(True)

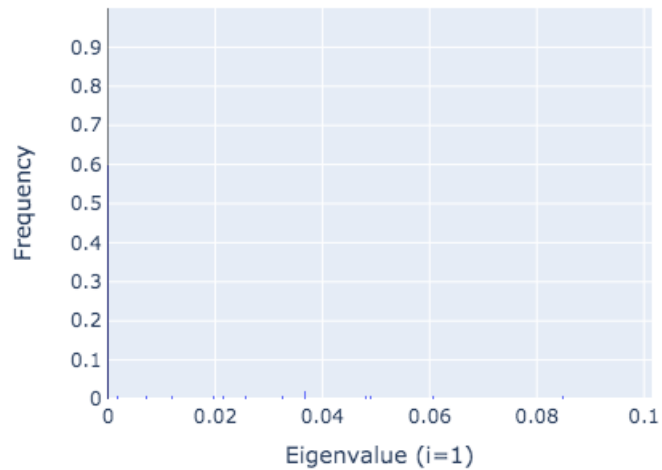
N=100

N=100, Nrep=100



Min: 0.8986226285598955
Max: 1.0000000000009304
|Max-Min|: 0.10137737144103487

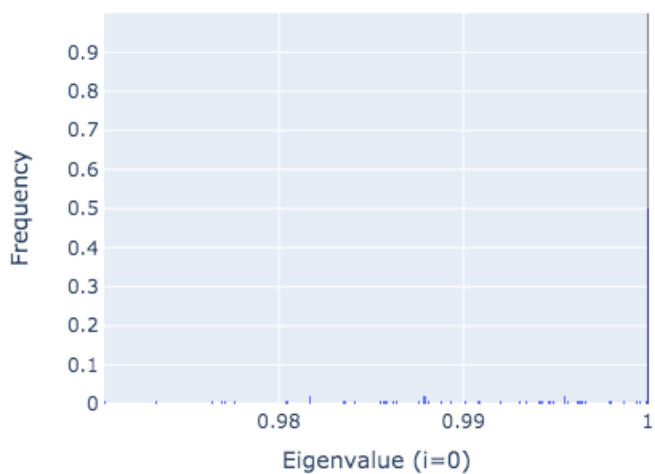
N=100, Nrep=100



Min: -9.306224459265484e-13
Max: 0.10137737144010481
|Max-Min|: 0.10137737144103542

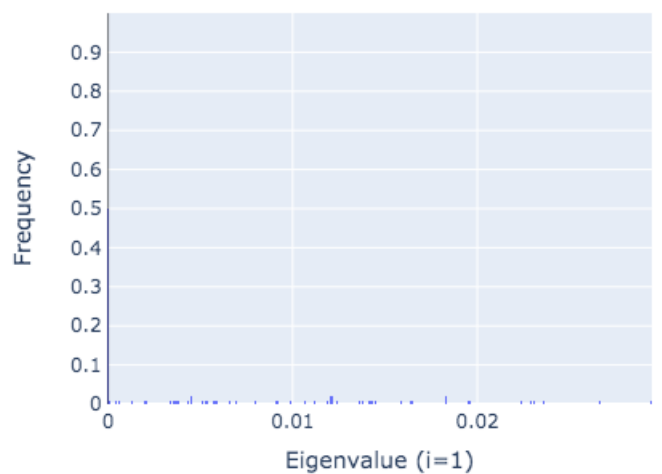
N=1000

N=1000, Nrep=100



Min: 0.9705943051079131
Max: 1.0000000000126343
|Max-Min|: 0.029405694904721225

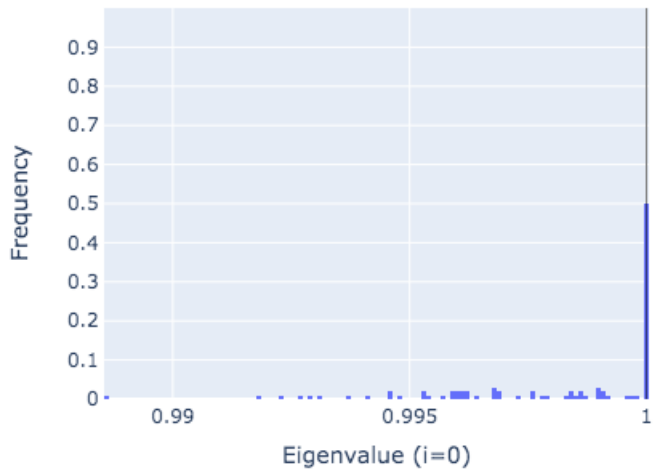
N=1000, Nrep=100



Min: -1.2634835348919929e-11
Max: 0.02940569489208648
|Max-Min|: 0.029405694904721315

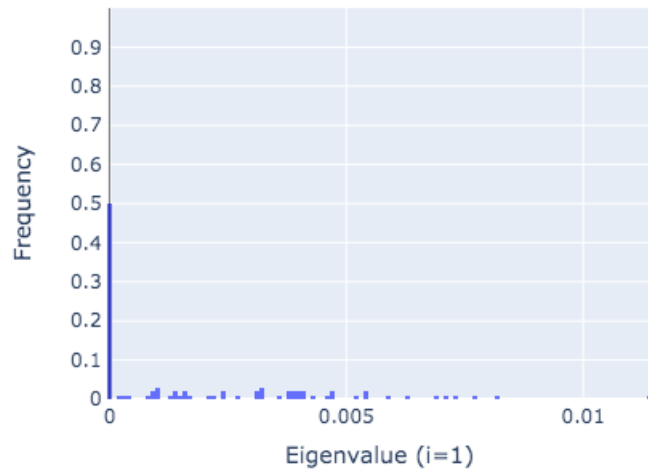
N=10000

N=10000, Nrep=100



Min: 0.9885819276231976
 Max: 1.0000000001516711
 |Max-Min|: 0.011418072528473489

N=10000, Nrep=100

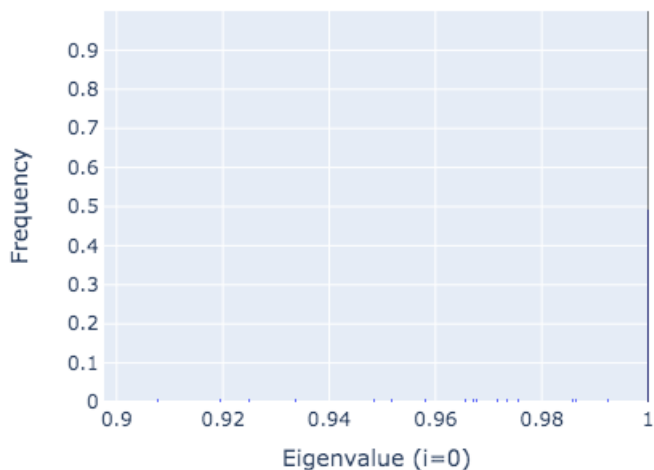


Min: -1.51670780996407e-10
 Max: 0.011418072376801695
 |Max-Min|: 0.011418072528472477

Case 3: ProjectedLinearEstimator(False)

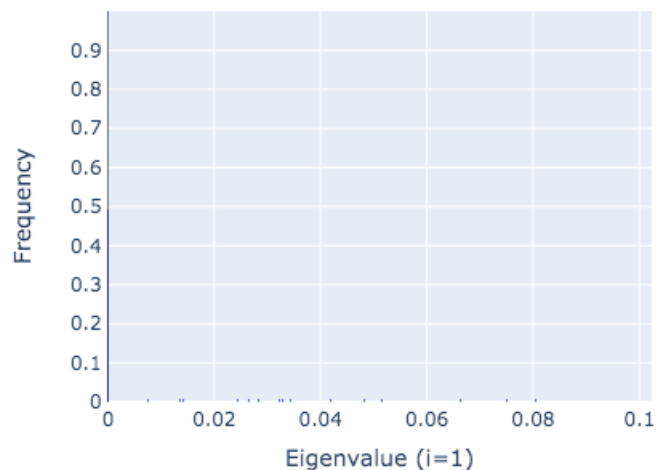
N=100

N=100, Nrep=100



Min: 0.8977436360270267
 Max: 1.0000000000014884
 |Max-Min|: 0.1022563639744617

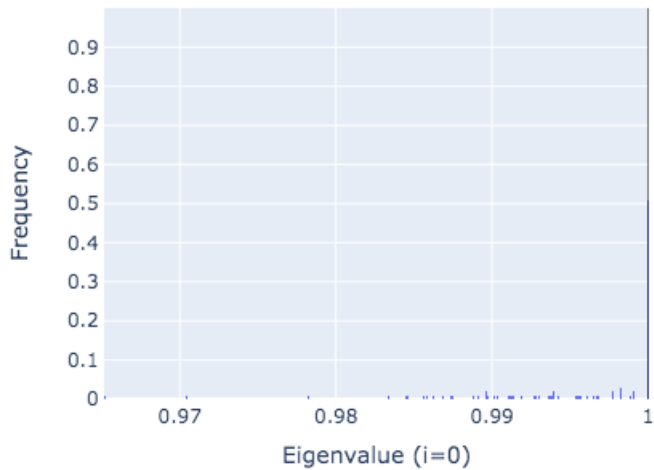
N=100, Nrep=100



Min: -1.4889802201828985e-12
 Max: 0.10225636397297323
 |Max-Min|: 0.10225636397446221

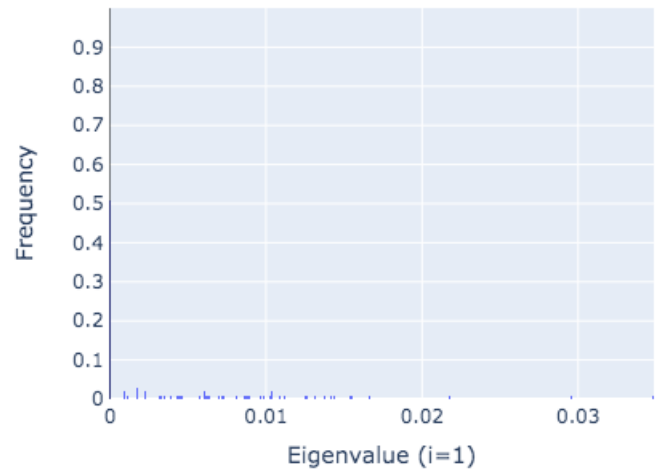
N=1000

N=1000, Nrep=100



Min: 0.9651892088172294
Max: 1.0000000000121578
|Max-Min|: 0.03481079119492847

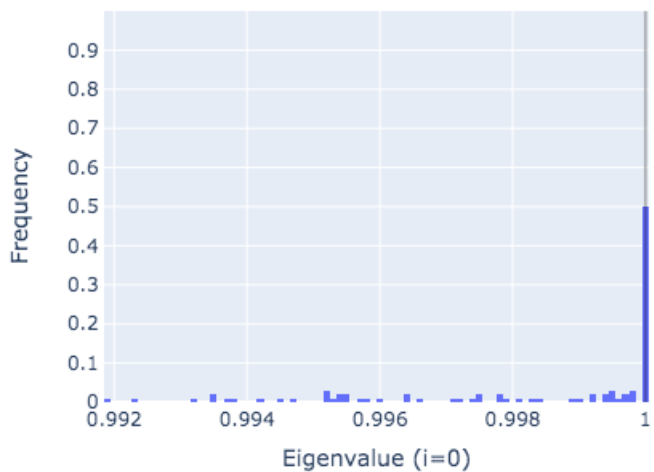
N=1000, Nrep=100



Min: -1.2158255693186201e-11
Max: 0.0348107911827703
|Max-Min|: 0.03481079119492855

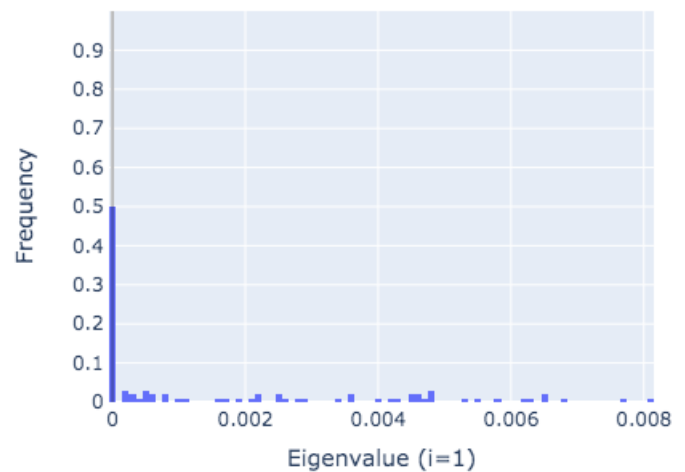
N=10000

N=10000, Nrep=100



Min: 0.9919080605153767
Max: 1.0000000000279459
|Max-Min|: 0.008091939512569146

N=10000, Nrep=100



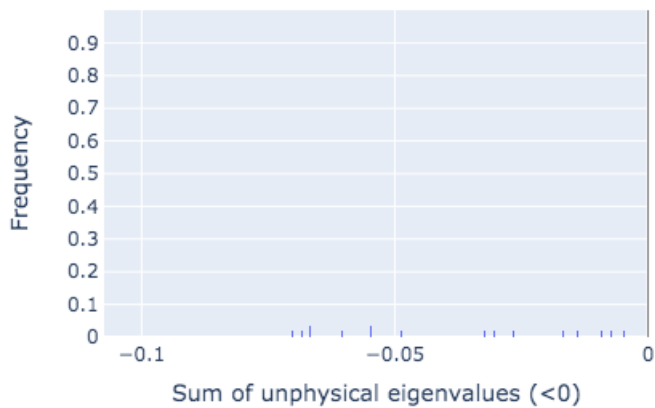
Min: -2.7945709912996674e-11
Max: 0.008091939484622813
|Max-Min|: 0.008091939512568523

Sum of unphysical eigenvalues

Case 0: LinearEstimator(True)

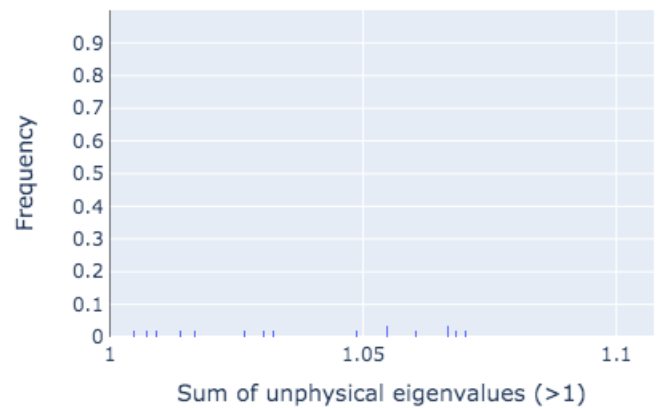
N=100

N=100, Nrep=56
Number of unphysical estimates=56



Min: -0.10737138556240879
Max: -0.0013980454688671121
|Max-Min|: 0.10597334009354167

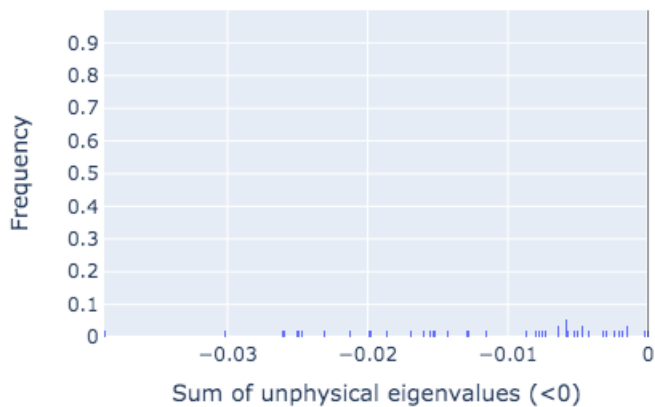
N=100, Nrep=56
Number of unphysical estimates=56



Min: 1.0013980454688673
Max: 1.1073713855624088
|Max-Min|: 0.10597334009354142

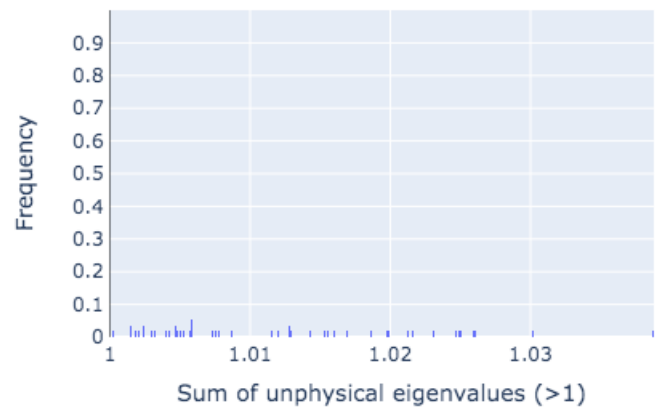
N=1000

N=1000, Nrep=56
Number of unphysical estimates=56



Min: -0.03873462855101516
Max: -1.2999831004603704e-05
|Max-Min|: 0.03872162872001055

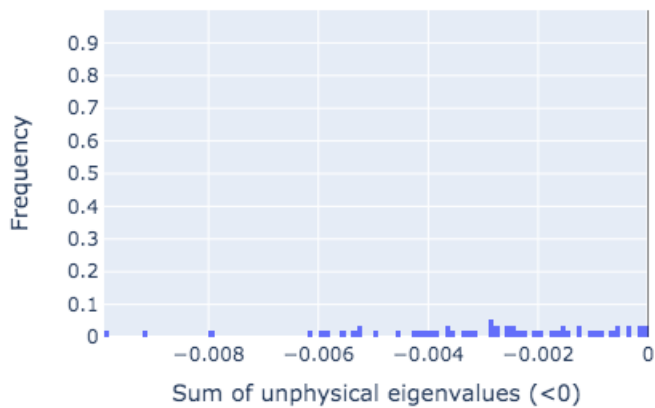
N=1000, Nrep=56
Number of unphysical estimates=56



Min: 1.0000129998310041
Max: 1.038734628551015
|Max-Min|: 0.03872162872001095

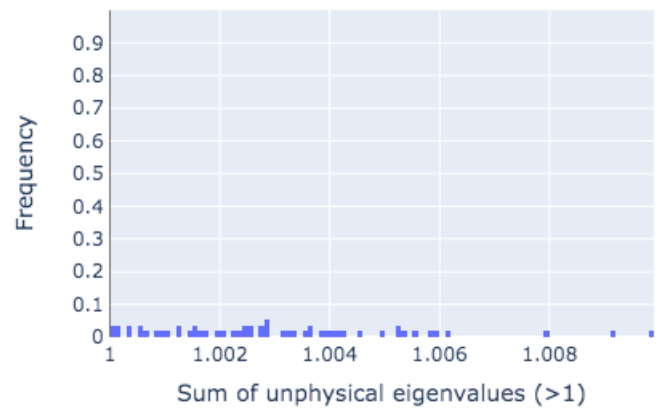
N=10000

N=10000, Nrep=55
Number of unphysical estimates=55



Min: -0.009820242830745339
Max: -1.367981286283877e-05
|Max-Min|: 0.0098065630178825

N=10000, Nrep=55
Number of unphysical estimates=55

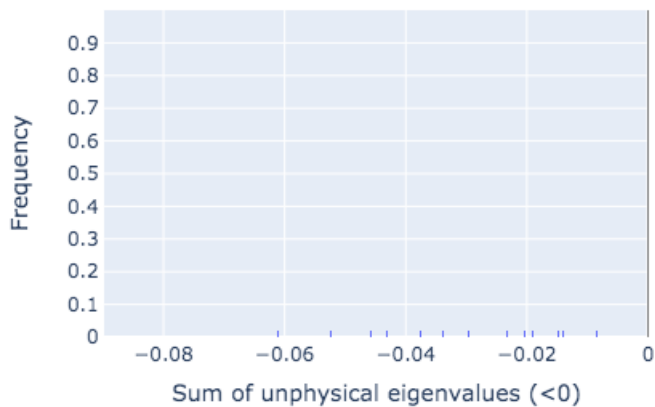


Min: 1.000013679812863
Max: 1.0098202428307452
|Max-Min|: 0.009806563017882297

Case 1: LinearEstimator(False)

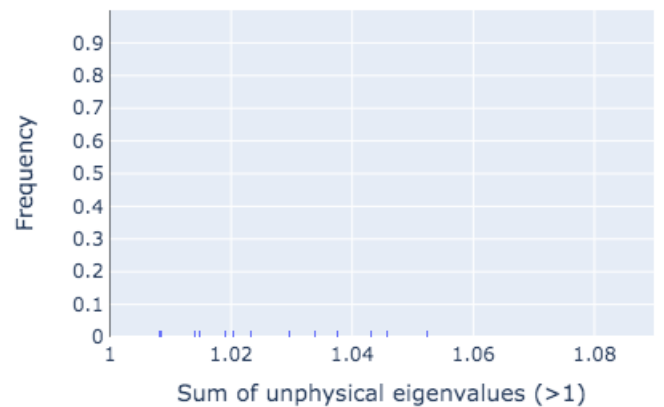
N=100

N=100, Nrep=48
Number of unphysical estimates=48



Min: -0.08974570791146932
Max: -0.002095608425328001
|Max-Min|: 0.08765009948614133

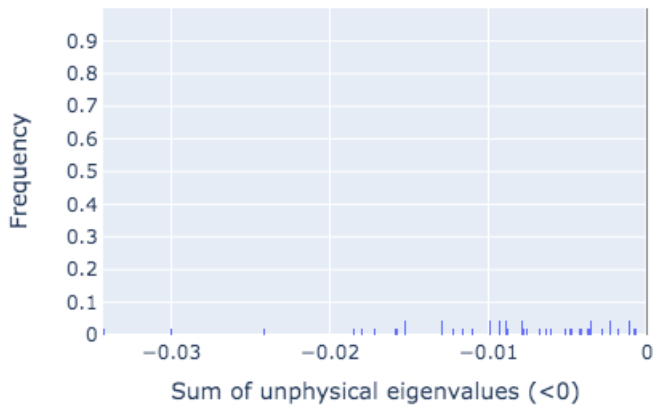
N=100, Nrep=48
Number of unphysical estimates=48



Min: 1.0020956084253272
Max: 1.08974570791147
|Max-Min|: 0.08765009948614289

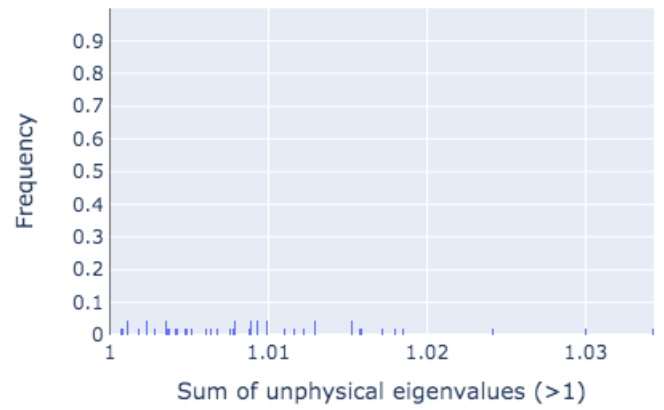
N=1000

N=1000, Nrep=46
Number of unphysical estimates=46



Min: -0.03429673403456271
Max: -0.00076541411925565
|Max-Min|: 0.03353131989337015

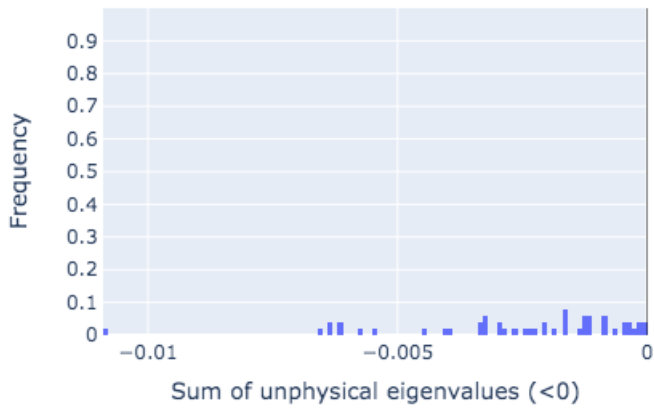
N=1000, Nrep=46
Number of unphysical estimates=46



Min: 1.00076541411926
Max: 1.0342967340345623
|Max-Min|: 0.03353131989336977

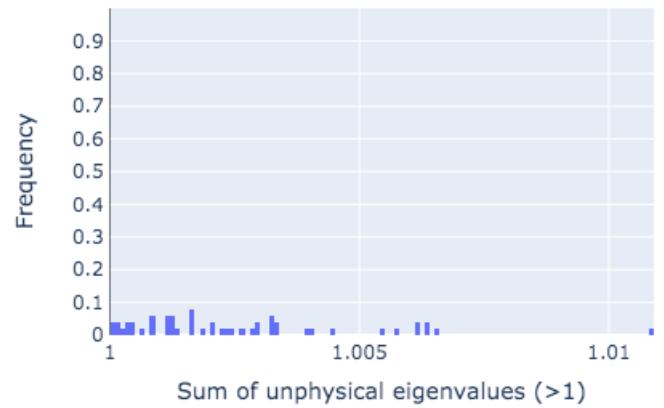
N=10000

N=10000, Nrep=50
Number of unphysical estimates=50



Min: -0.010864757054154343
Max: -4.852764506780333e-05
|Max-Min|: 0.01081622940908654

N=10000, Nrep=50
Number of unphysical estimates=50

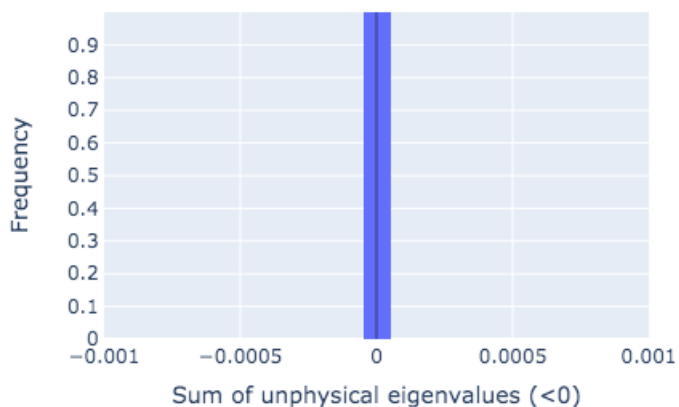


Min: 1.0000485276450675
Max: 1.0108647570541545
|Max-Min|: 0.010816229409086997

Case 2: ProjectedLinearEstimator(True)

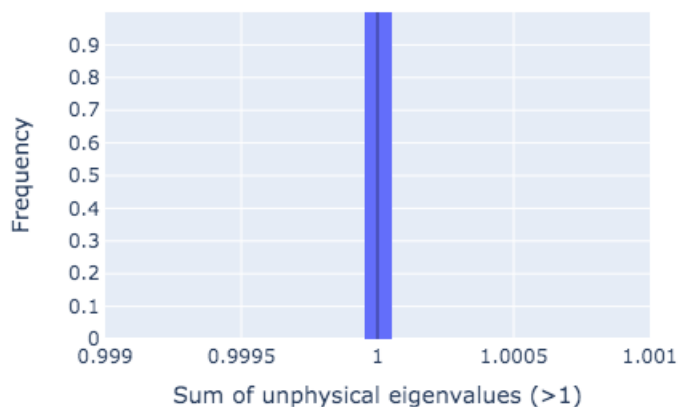
N=100

N=100, Nrep=16
Number of unphysical estimates=16



Min: $-9.306224459265484 \times 10^{-13}$
Max: $-1.0114343792145144 \times 10^{-13}$
|Max-Min|: $8.29479008005097 \times 10^{-13}$

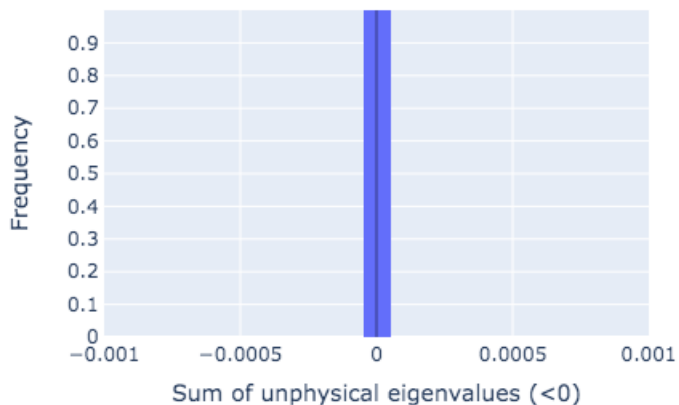
N=100, Nrep=16
Number of unphysical estimates=16



Min: 1.00000000000001013
Max: 1.00000000000009304
|Max-Min|: $8.291145547900669 \times 10^{-13}$

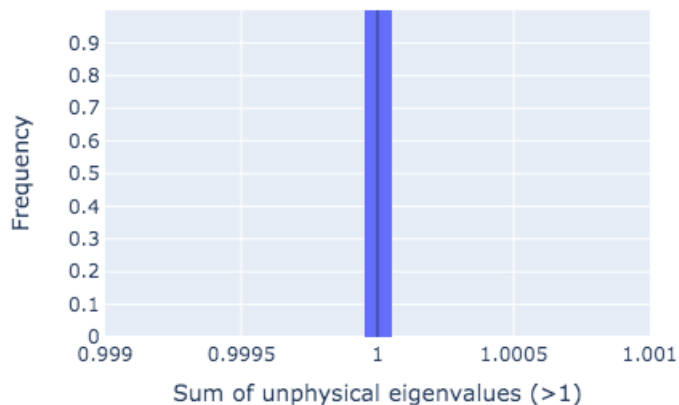
N=1000

N=1000, Nrep=32
Number of unphysical estimates=32



Min: $-1.2634835348919929 \times 10^{-11}$
Max: $-1.0549739363132764 \times 10^{-13}$
|Max-Min|: $1.2529337955288602 \times 10^{-11}$

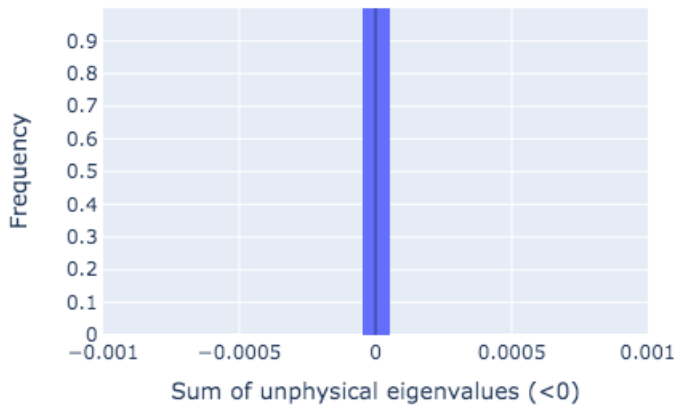
N=1000, Nrep=32
Number of unphysical estimates=32



Min: 1.00000000000001048
Max: 1.000000000000126343
|Max-Min|: $1.2529532966709667 \times 10^{-11}$

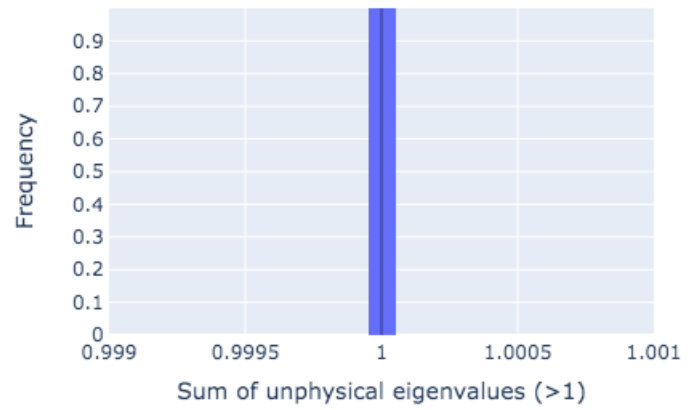
N=10000

N=10000, Nrep=50
Number of unphysical estimates=50



Min: -1.51670780996407e-10
Max: -1.0141518784760772e-13
|Max-Min|: 1.515693658085594e-10

N=10000, Nrep=50
Number of unphysical estimates=50

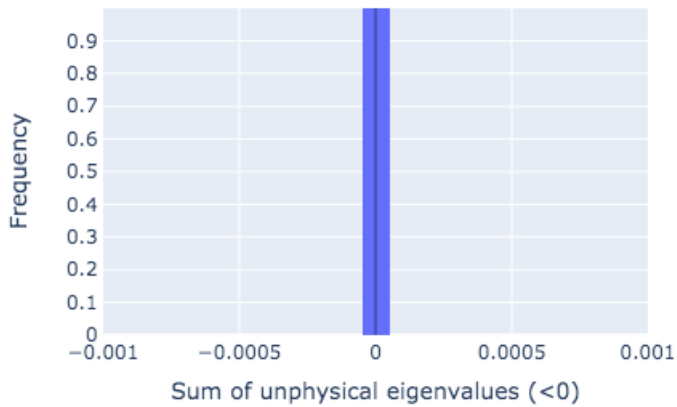


Min: 1.00000000000001013
Max: 1.00000000001516711
|Max-Min|: 1.5156986776787562e-10

Case 3: ProjectedLinearEstimator(False)

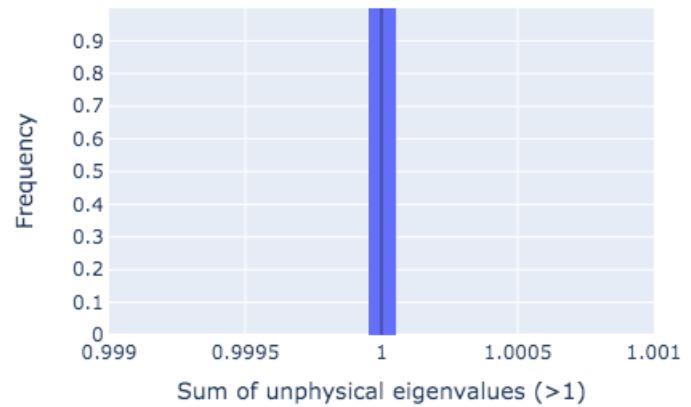
N=100

N=100, Nrep=17
Number of unphysical estimates=17



Min: -1.4889802201828985e-12
Max: -1.0116813698156475e-13
|Max-Min|: 1.3878120832013337e-12

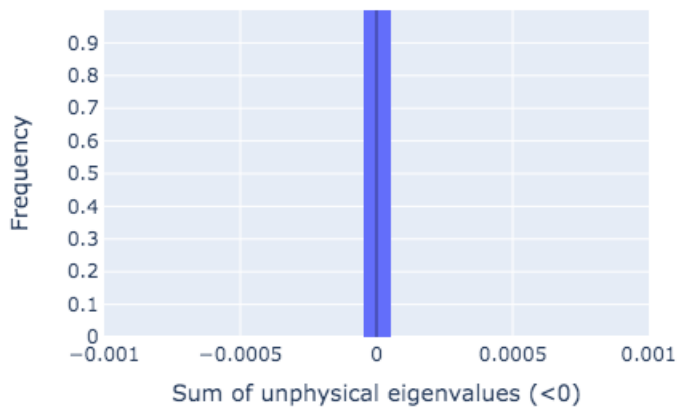
N=100, Nrep=17
Number of unphysical estimates=17



Min: 1.00000000000001013
Max: 1.0000000000014884
|Max-Min|: 1.3871126469666706e-12

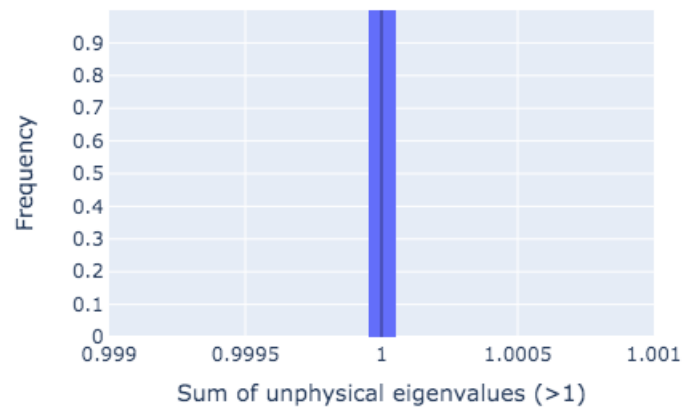
N=1000

N=1000, Nrep=30
Number of unphysical estimates=30



Min: -1.2158255693186201e-11
Max: -1.0561238991422653e-13
|Max-Min|: 1.2052643303271975e-11

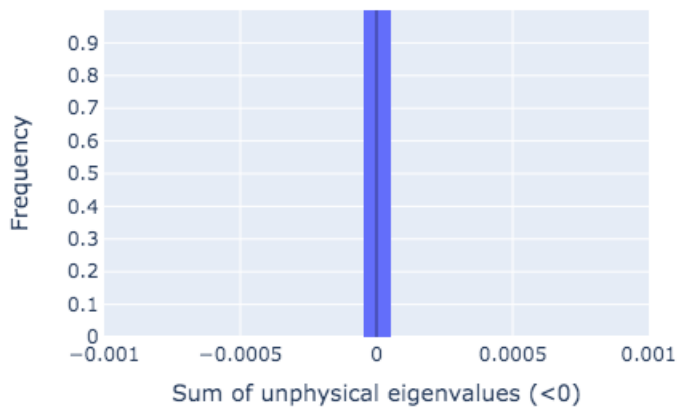
N=1000, Nrep=30
Number of unphysical estimates=30



Min: 1.0000000000001057
Max: 1.0000000000121578
|Max-Min|: 1.205213706612085e-11

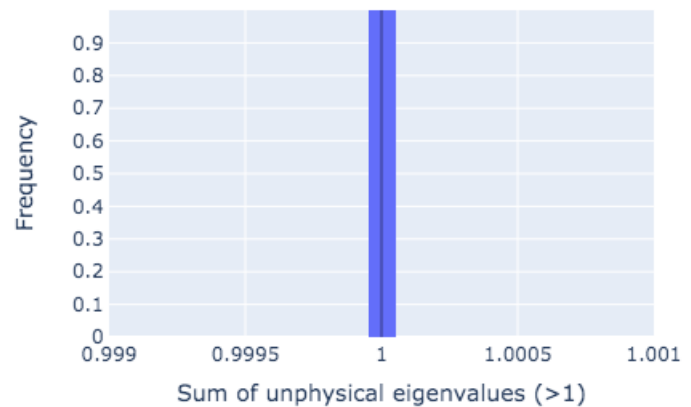
N=10000

N=10000, Nrep=50
Number of unphysical estimates=50



Min: -2.7945709912996674e-11
Max: -1.150714736951101e-13
|Max-Min|: 2.7830638439301564e-11

N=10000, Nrep=50
Number of unphysical estimates=50



Min: 1.0000000000001146
Max: 1.0000000000279459
|Max-Min|: 2.783129282590835e-11