### **Table of contents**

| Table of contents              | 1 |
|--------------------------------|---|
| Experimental condition         | 1 |
| True object                    | 1 |
| Tester objects                 | 1 |
| Cases                          | 2 |
| Consistency test               | 2 |
| MSE                            | 2 |
| Physicality violation test     | 3 |
| on_para_eq_constraint=True     | 3 |
| Case 0: LinearEstimator(True)  | 3 |
|                                | 4 |
| on_para_eq_constraint=False    | 4 |
| Case 1: LinearEstimator(False) | 4 |
| Eigenvalue                     | 4 |
| Sum of unphysical eigenvalues  | 5 |

# **Experimental condition**

| Type of tomography | Standard()st |
|--------------------|--------------|
| Nrep               | 100          |
| N                  | [100, 1000]  |

## True object

| Туре | State                         |
|------|-------------------------------|
| Dim  | 2                             |
| Vec  | [0.70710678 0. 0. 0.70710678] |

## **Tester objects**

| 0 | Туре     | Povm   |
|---|----------|--|
|   | Dim      | 2  |
|   | Outcomes | 2  |
|   | Vecs     | [0.70710678 0.70710678 0. 0. ]<br>[ 0.70710678 -0.70710678 0. 0. ] |

| 1 | Туре     | Povm  |
|---|----------|---|
|   | Dim      | 2   |
|   | Outcomes | 2   |
|   | Vecs     | [0.70710678 0. 0.70710678 0. ]<br>[ 0.70710678 00.70710678 0. ] |
| 2 | Туре     | Povm  |
|   | Dim      | 2   |
|   | Outcomes | 2   |
|   | Vecs     | [0.70710678 0. 0. 0.70710678]<br>[ 0.70710678 0. 00.70710678]   |

### Cases

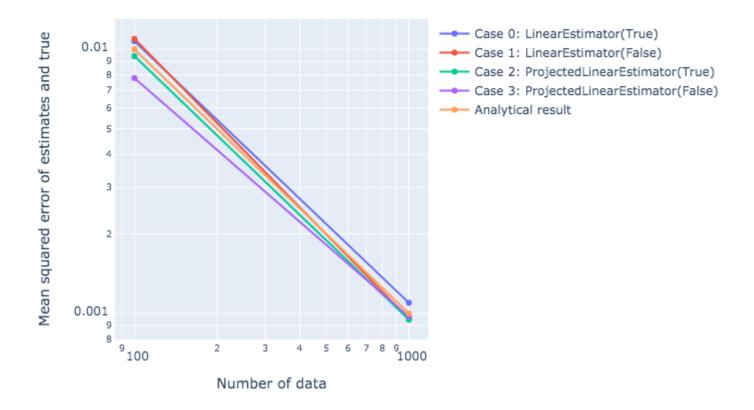
|   | Name                        | Parameterization | Tomography  | Estimator                |
|---|-----------------------------|------------------|-------------|--------------------------|
| 0 | LinearEstimator(True)       | True             | StandardQst | LinearEstimator          |
| 1 | LinearEstimator(False)      | False            | StandardQst | LinearEstimator          |
| 2 | jectedLinearEstimator(True) | True             | StandardQst | ProjectedLinearEstimator |
| 3 | ectedLinearEstimator(False) | False            | StandardQst | ProjectedLinearEstimator |

# **Consistency test**

(TODO)

## MSE

### Mean squared error

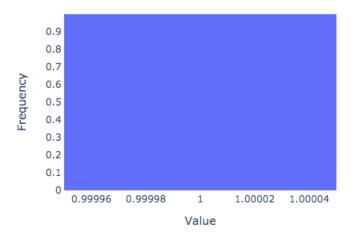


## **Physicality violation test**

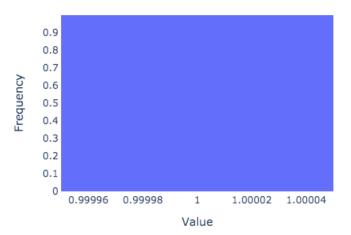
on\_para\_eq\_constraint=True

**Case 0: LinearEstimator(True)** 





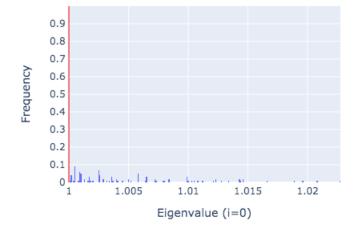
#### N=1000, Nrep=100



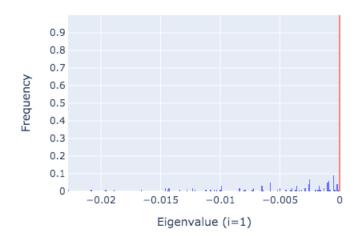
### on\_para\_eq\_constraint=False

#### **Case 1: LinearEstimator(False)**

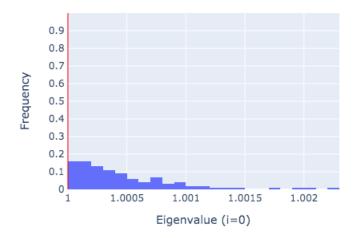
#### **Eigenvalue**



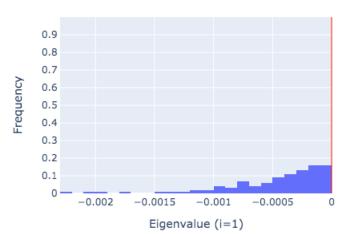
### N=100, Nrep=100



#### N=1000, Nrep=100

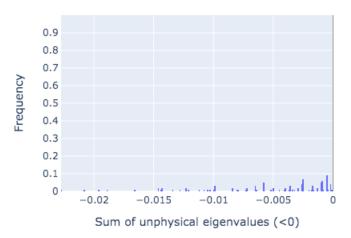


N=1000, Nrep=100

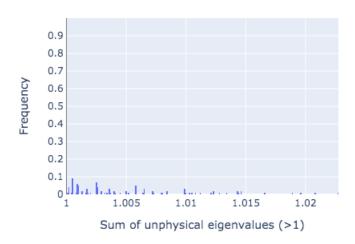


#### Sum of unphysical eigenvalues

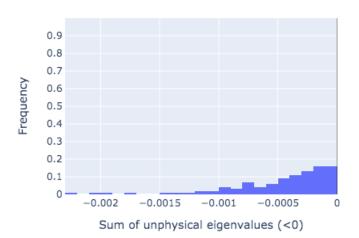
N=100, Nrep=100 Number of unphysical estimates=100



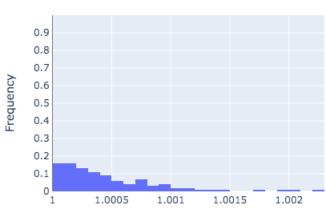
N=100, Nrep=100 Number of unphysical estimates=100



N=1000, Nrep=100 Number of unphysical estimates=100



N=1000, Nrep=100 Number of unphysical estimates=100



Sum of unphysical eigenvalues (>1)