

GetPauliString

```
SetDirectory @ NotebookDirectory[];  
Import["../Link/QuESTlink.m"];
```

Doc

? GetPauliString

Symbol

Returns a Pauli string or a weighted sum of symbolic Pauli tensors from a variety of input formats.

GetPauliString[matrix] returns a complex-weighted sum of Pauli tensors

equivalent to the given matrix. If the input matrix is Hermitian, the output can

be passed to Chop[] in order to remove the negligible imaginary components.

GetPauliString[index] returns the basis Pauli string corresponding to the given index, where the returned Pauli operator targeting 0 is informed by the least significant bit(s) of the index.

GetPauliString[digits] specifies the Pauli product via the

base-4 digits of its index, where the rightmost digit is the least significant.

GetPauliString[address] opens or downloads the file at address (a string, of a file location or URL), and interprets it as a list of coefficients and Pauli codes. Each line of the file is assumed a separate Pauli tensor with format {coeff code1 code2 ... codeN} (excluding braces) where the codes are in {0,1,2,3} (indicating a I, X, Y, Z), for an N-qubit Pauli string, and are given in order of increasing significance (zero qubit left). Each line must have N+1 terms, which includes the initial real decimal coefficient. For an example, see "https://qtechtheory.org/hamil_6qbLiH.txt".

GetPauliString[..., numQubits] overrides the inferred number of qubits, introducing additional Id operators upon un-targeted qubits (unless explicitly removed with "Removelds" -> False).

GetPauliString[..., {targets}] specifies a list of qubits which the returned Pauli string should target (in the given order), instead of the default targets {0, 1, 2, ...}.

GetPauliString accepts optional argument "Removelds" -> True or False (default Automatic) which when True, retains otherwise removed Id operators so that the returned string has an explicit Pauli operator acting upon every qubit.



Correctness

Matrix

Floating-point

```
test[in_?MatrixQ] := Module[
  {out, check, error},
  out = GetPauliString[in];
  check = Simplify @ Normal @ CalcPauliExpressionMatrix[out];
  error = check - in // N // Abs // Chop // Max;
  Echo[out, "output: "];
  Echo[error, "error: "];
  If[error != 0, Style["ERRONEOUS PAULI STRING!", Red]]]
```

```
test @ RandomComplex[{1 + 1} {-10, 10}, {2, 2}]
```

» output: $(-3.63666 - 1.8183 i) \text{Id}_0 - (6.59815 + 1.0064 i) X_0 +$
 $(0.771499 - 1.37882 i) Y_0 + (3.11331 - 4.73809 i) Z_0$

» error: 0

```
test @ RandomComplex[{1 + 1} {-10, 10}, {8, 8}]
```

» output: $(-1.62543 - 1.36107 i) \text{Id}_2 + (0.48001 - 1.24454 i) X_0 -$
 $(0.228755 + 0.332632 i) X_1 + (1.74878 + 4.82058 i) X_0 X_1 + (3.85326 - 0.811759 i) X_2 -$
 $(3.68631 + 0.864865 i) X_0 X_2 + (2.00587 - 1.84927 i) X_1 X_2 - (2.54557 - 2.28896 i) X_0 X_1 X_2 +$
 $(0.0815604 - 0.811481 i) Y_0 - (1.45722 - 0.369288 i) X_1 Y_0 - (2.73035 + 0.744658 i) X_2 Y_0 -$
 $(1.66986 + 0.226748 i) X_1 X_2 Y_0 + (1.34834 + 0.580334 i) Y_1 - (1.37587 - 1.21945 i) X_0 Y_1 -$
 $(0.0518701 + 2.36052 i) X_2 Y_1 - (1.80847 - 1.20918 i) X_0 X_2 Y_1 - (0.703751 - 1.07648 i) Y_0 Y_1 -$
 $(0.407713 + 1.64509 i) X_2 Y_0 Y_1 - (1.85829 - 0.030126 i) Y_2 - (0.227592 + 2.02206 i) X_0 Y_2 +$
 $(1.61102 - 0.897051 i) X_1 Y_2 + (3.14443 + 3.61116 i) X_0 X_1 Y_2 - (2.66848 + 1.99469 i) Y_0 Y_2 -$
 $(1.60502 - 1.20522 i) X_1 Y_0 Y_2 - (1.62124 + 2.19159 i) Y_1 Y_2 - (1.62018 - 0.511701 i) X_0 Y_1 Y_2 +$
 $(4.46798 + 1.84508 i) Y_0 Y_1 Y_2 - (0.547915 + 0.78593 i) Z_0 + (0.012767 - 1.3868 i) X_1 Z_0 +$
 $(0.794937 - 3.18716 i) X_2 Z_0 - (5.12437 - 2.96624 i) X_1 X_2 Z_0 - (2.59567 + 0.998799 i) Y_1 Z_0 -$
 $(0.966159 - 0.267933 i) X_2 Y_1 Z_0 + (1.46437 + 1.4389 i) Y_2 Z_0 + (1.58968 + 0.410816 i) X_1 Y_2 Z_0 -$
 $(2.73787 - 1.82731 i) Y_1 Y_2 Z_0 + (0.294366 - 1.03406 i) Z_1 + (1.10668 + 0.210221 i) X_0 Z_1 -$
 $(1.39769 + 0.694416 i) X_2 Z_1 + (3.13758 + 2.1846 i) X_0 X_2 Z_1 + (0.836065 - 0.967424 i) Y_0 Z_1 -$
 $(0.359847 + 0.214651 i) X_2 Y_0 Z_1 - (0.107371 + 2.06735 i) Y_2 Z_1 -$
 $(1.28211 + 1.04295 i) X_0 Y_2 Z_1 - (0.820905 + 0.459206 i) Y_0 Y_2 Z_1 + (0.245161 - 3.31782 i) Z_0 Z_1 +$
 $(3.34046 - 1.81756 i) X_2 Z_0 Z_1 - (2.13915 - 0.518328 i) Y_2 Z_0 Z_1 + (2.3632 - 2.48517 i) Z_2 -$
 $(0.392865 - 0.619911 i) X_0 Z_2 - (1.054 - 1.1786 i) X_1 Z_2 - (1.59766 + 1.53721 i) X_0 X_1 Z_2 -$
 $(3.02483 - 1.00772 i) Y_0 Z_2 - (0.889534 - 2.07062 i) X_1 Y_0 Z_2 - (0.527526 - 2.10373 i) Y_1 Z_2 -$
 $(0.449855 + 0.25815 i) X_0 Y_1 Z_2 + (3.23276 + 1.3389 i) Y_0 Y_1 Z_2 + (1.61785 + 0.732421 i) Z_0 Z_2 +$
 $(1.44385 + 2.57825 i) X_1 Z_0 Z_2 + (2.59134 + 1.50852 i) Y_1 Z_0 Z_2 - (1.78751 - 2.86908 i) Z_1 Z_2 +$
 $(4.11803 - 4.42526 i) X_0 Z_1 Z_2 + (0.92451 + 1.86465 i) Y_0 Z_1 Z_2 + (1.25525 + 0.618944 i) Z_0 Z_1 Z_2$

» error: 0

```
test @ RandomReal[{-10, 10}, {4, 4}]
```

» **output:** $-4.70395 \text{Id}_1 + 2.5309 X_0 - 1.31694 X_1 - 3.27382 X_0 X_1 - (0. + 4.2844 \text{i}) Y_0 -$
 $(0. + 2.8947 \text{i}) X_1 Y_0 + (0. + 3.35297 \text{i}) Y_1 + (0. + 0.0473311 \text{i}) X_0 Y_1 -$
 $3.61675 Y_0 Y_1 + 1.77139 Z_0 + 0.814698 X_1 Z_0 + (0. + 4.54525 \text{i}) Y_1 Z_0 +$
 $3.73559 Z_1 + 5.33504 X_0 Z_1 + (0. + 2.32713 \text{i}) Y_0 Z_1 + 2.40629 Z_0 Z_1$

» **error:** 0

hermitian = -i MatrixLog @ RandomVariate @ CircularUnitaryMatrixDistribution @ 4;
test @ hermitian

» **output:** $(-0.723109 + 9.81203 \times 10^{-17} \text{i}) \text{Id}_1 - (0.999802 + 1.94289 \times 10^{-16} \text{i}) X_0 +$
 $(0.0959688 + 1.11022 \times 10^{-16} \text{i}) X_1 - (0.458241 + 0. \text{i}) X_0 X_1 -$
 $(0.260922 + 1.38778 \times 10^{-16} \text{i}) Y_0 + (0.456045 - 4.85723 \times 10^{-17} \text{i}) X_1 Y_0 +$
 $(0.404084 + 1.66533 \times 10^{-16} \text{i}) Y_1 + (0.390681 + 6.245 \times 10^{-17} \text{i}) X_0 Y_1 -$
 $(0.528075 - 1.11022 \times 10^{-16} \text{i}) Y_0 Y_1 - (0.0329092 + 3.57787 \times 10^{-18} \text{i}) Z_0 -$
 $(0.207899 + 5.55112 \times 10^{-17} \text{i}) X_1 Z_0 - (0.1593 - 1.11022 \times 10^{-16} \text{i}) Y_1 Z_0 +$
 $(0.167862 - 2.15865 \times 10^{-16} \text{i}) Z_1 - (0.300475 - 1.94289 \times 10^{-16} \text{i}) X_0 Z_1 +$
 $(0.115991 + 1.38778 \times 10^{-16} \text{i}) Y_0 Z_1 - (0.271469 - 1.19587 \times 10^{-16} \text{i}) Z_0 Z_1$

» **error:** 0

test @ Table[0., 2, 2]

» **output:** $0. + 0. \text{i}$

» **error:** 0

Integer

test @ RandomInteger[{-10, 10}, {2, 2}]

» **output:** $\frac{17 \text{Id}_0}{2} + 2 X_0 + \text{i} Y_0 - \frac{Z_0}{2}$

» **error:** 0

test @ RandomInteger[{-10, 10}, {4, 4}]

» **output:** $-\frac{17 \text{Id}_1}{4} + \frac{7 X_0}{4} + 3 X_1 + \frac{23 X_0 X_1}{4} + \frac{\text{i} Y_0}{4} + \frac{7}{4} \text{i} X_1 Y_0 + \frac{3 \text{i} Y_1}{2} -$
 $\frac{9}{4} \text{i} X_0 Y_1 - \frac{11 Y_0 Y_1}{4} - \frac{11 Z_0}{4} + 4 X_1 Z_0 - \frac{5}{2} \text{i} Y_1 Z_0 + \frac{13 Z_1}{4} + \frac{X_0 Z_1}{4} + \frac{3}{4} \text{i} Y_0 Z_1 - \frac{5 Z_0 Z_1}{4}$

» **error:** 0

test @ Table[1, {i, 8}, {i, 8}]

» **output:** $\text{Id}_2 + X_0 + X_1 + X_0 X_1 + X_2 + X_0 X_2 + X_1 X_2 + X_0 X_1 X_2$

» **error:** 0

test @ Table[0, {i, 8}, {i, 8}]

» **output:** 0

» **error:** 0

test[IdentityMatrix[8]]

» **output:** Id_2

» **error:** 0

Symbolic

```
test @ {{a, b}, {c, d}}
```

» output: $\frac{1}{2} (a + d) \text{Id}_0 + \frac{1}{2} (b + c) X_0 + \frac{1}{2} (i b - i c) Y_0 + \frac{1}{2} (a - d) Z_0$

» error: 0

```
test[ a IdentityMatrix[4] ]
```

» output: $a \text{Id}_1$

» error: 0

```
test @ Table[a, {i, 8}, {i, 8}]
```

» output: $a \text{Id}_2 + a X_0 + a X_1 + a X_0 X_1 + a X_2 + a X_0 X_2 + a X_1 X_2 + a X_0 X_1 X_2$

» error: 0

```
test @ RandomChoice[{a, b, c, d}, {4, 4}]
```

» output: $\frac{1}{4} (2 a + 2 b) \text{Id}_1 + \frac{1}{4} (b + 3 c) X_0 + \frac{1}{4} (2 b + 2 c) X_1 + \frac{1}{4} (2 a + c + d) X_0 X_1 +$
 $\frac{1}{4} (i b - i c) Y_0 + \frac{1}{4} (-i c + i d) X_1 Y_0 + \frac{1}{4} (-2 i b + 2 i c) Y_1 + \frac{1}{4} (-i c + i d) X_0 Y_1 +$
 $\frac{1}{4} (2 a - c - d) Y_0 Y_1 + \frac{1}{4} (-2 a + 2 b) Z_1 + \frac{1}{4} (b - c) X_0 Z_1 + \frac{1}{4} (i b - i c) Y_0 Z_1$

» error: 0

numQubits

```
m = RandomInteger[{-10, 10}, {4, 4}];
GetPauliString[m, 5]
GetPauliString[m, 5, "RemoveIds" → True];
CalcPauliExpressionMatrix[%] == CalcPauliExpressionMatrix[%]
```

$$-\frac{11}{4} \text{Id}_0 \text{Id}_1 \text{Id}_2 \text{Id}_3 \text{Id}_4 + \frac{15}{4} \text{Id}_1 \text{Id}_2 \text{Id}_3 \text{Id}_4 X_0 - 3 \text{Id}_0 \text{Id}_2 \text{Id}_3 \text{Id}_4 X_1 - 2 \text{Id}_2 \text{Id}_3 \text{Id}_4 X_0 X_1 -$$

$$\frac{9}{4} i \text{Id}_1 \text{Id}_2 \text{Id}_3 \text{Id}_4 Y_0 + i \text{Id}_2 \text{Id}_3 \text{Id}_4 X_1 Y_0 + \frac{7}{2} i \text{Id}_0 \text{Id}_2 \text{Id}_3 \text{Id}_4 Y_1 + \frac{5}{2} i \text{Id}_2 \text{Id}_3 \text{Id}_4 X_0 Y_1 -$$

$$\frac{5}{2} \text{Id}_2 \text{Id}_3 \text{Id}_4 Y_0 Y_1 + \frac{21}{4} \text{Id}_1 \text{Id}_2 \text{Id}_3 \text{Id}_4 Z_0 + \frac{3}{2} \text{Id}_2 \text{Id}_3 \text{Id}_4 X_1 Z_0 + 5 i \text{Id}_2 \text{Id}_3 \text{Id}_4 Y_1 Z_0 +$$

$$\frac{3}{4} \text{Id}_0 \text{Id}_2 \text{Id}_3 \text{Id}_4 Z_1 - \frac{13}{4} \text{Id}_2 \text{Id}_3 \text{Id}_4 X_0 Z_1 - \frac{1}{4} i \text{Id}_2 \text{Id}_3 \text{Id}_4 Y_0 Z_1 + \frac{11}{4} \text{Id}_2 \text{Id}_3 \text{Id}_4 Z_0 Z_1$$

```
True
```

targets

```

m = RandomInteger[{-10, 10}, {2, 2}];
GetPauliString[m]
GetPauliString[m, {5}]

$$\frac{11 \text{Id}_0}{2} - 3 X_0 + 6 \text{i} Y_0 + \frac{3 Z_0}{2}$$


$$\frac{11 \text{Id}_5}{2} - 3 X_5 + 6 \text{i} Y_5 + \frac{3 Z_5}{2}$$


m = RandomComplex[{-1 - \text{i}, 1 + \text{i}}, {4, 4}];
pA = GetPauliString[m];
mA = KroneckerProduct[CalcPauliExpressionMatrix[pA], IdentityMatrix[4]];
pB = GetPauliString[m, {2, 3}];
mB = CalcPauliExpressionMatrix[pB];

mA - mB // Abs // Max
0.

```

Removelds

```

m = RandomInteger[{-10, 10}, {4, 4}];
GetPauliString[m];
GetPauliString[m, "RemoveIds" → False]
CalcPauliExpressionMatrix[%] == CalcPauliExpressionMatrix[%]

$$8 \text{Id}_0 \text{Id}_1 + \frac{7 \text{Id}_1 X_0}{4} + 3 \text{Id}_0 X_1 + \frac{11 X_0 X_1}{4} - \frac{9}{4} \text{i} \text{Id}_1 Y_0 - \frac{13}{4} \text{i} X_1 Y_0 + \frac{3}{2} \text{i} \text{Id}_0 Y_1 -$$


$$\frac{3}{4} \text{i} X_0 Y_1 - \frac{5 Y_0 Y_1}{4} + \text{Id}_1 Z_0 - \frac{3 X_1 Z_0}{2} + 4 \text{i} Y_1 Z_0 + \text{Id}_0 Z_1 - \frac{5 X_0 Z_1}{4} - \frac{25}{4} \text{i} Y_0 Z_1 - Z_0 Z_1$$


True

```

Index

```

GetPauliString[41 - 1]
GetPauliString[42 - 1]
GetPauliString[43 - 1]

Z0
Z0 Z1
Z0 Z1 Z2

GetPauliString[5]
X0 X1

```

numQubits

```
GetPauliString[0]
GetPauliString[0, 2]
GetPauliString[0, 3]
Id0
Id0 Id1
Id0 Id1 Id2
```

targets

```
GetPauliString[0]
GetPauliString[0, {52}]
Id0
Id52

GetPauliString[123]
GetPauliString[123, {9, 8, 7, 6}]
X3 Y1 Z0 Z2
X6 Y8 Z7 Z9

GetPauliString[3, 3, {1, 2, 3}]
Id2 Id3 Z1
```

Removelds

```
GetPauliString[4, "RemoveIds" → False]
Id0 X1

GetPauliString[0, 5, "RemoveIds" → False]
Id0 Id1 Id2 Id3 Id4

GetPauliString[56 921, 10, "RemoveIds" → False]
Id8 Id9 X0 X2 X3 X6 Y1 Y4 Z5 Z7

GetPauliString[0, "RemoveIds" → True]
Id0

GetPauliString[0, 5, "RemoveIds" → True]
Id4

GetPauliString[1, "RemoveIds" → True]
X0
```

Digits

```
GetPauliString[{0, 0, 0}]
QuEST`Private`getPauliStringFromDigits[{0, 0, 0}, True]

GetPauliString[{0, 0, 0}, 4]
QuEST`Private`getPauliStringFromDigits[{0, 0, 0}, 4, False]

GetPauliString[{0, 0, 0}, 4, "RemoveIds" → True]
QuEST`Private`getPauliStringFromDigits[{0, 0, 0}, 4, True]

GetPauliString[{1, 0, 0}, {1, 2, 3}]
```

... **GetPauliString**: A different number of target qubits was given (3) than exists in the Pauli string (–Infinity).

\$Failed

Address

File

```
setTmpFile[str_] := (
  DeleteFile["tmp.txt"];
  WriteString["tmp.txt", str])
```

```
setTmpFile["12.3 0"];
GetPauliString["tmp.txt"]
12.3 Id0
```

```
setTmpFile[".1 0 1 2 3"];
GetPauliString["tmp.txt"]
0.1 X1 Y2 Z3
```

```
setTmpFile["99 0 1 2 3\n33 3 2 1 0"];
GetPauliString["tmp.txt"]
33 X2 Y1 Z0 + 99 X1 Y2 Z3
```

URL

```
GetPauliString["https://qtechtheory.org/hamil_6qbLiH.txt"]
-6.52209 Id0 - 0.00168947 X0 + 0.000335609 X1 + 0.00233908 X0 X1 - 0.00518865 X2 -
2.32678 × 10-6 X0 X2 - 0.00238276 X1 X2 - 0.000333484 X0 X1 X2 + 0.0561302 X3 +
0.0000211588 X0 X3 + 0.0000198838 X0 X1 X3 - 0.000133652 X2 X3 - 0.0000311241 X1 X2 X3 +
0.000547046 X4 + 0.00165752 X3 X4 - 0.00600013 X0 X3 X4 - 0.00812442 X2 X3 X4 +
0.000447423 X5 - 0.0000517994 X0 X5 + 0.00019084 X0 X1 X5 - 0.0000777401 X2 X5 -
0.0001908 X1 X2 X5 - 0.00630859 X3 X5 + 0.0661688 X4 X5 + 0.0000169999 X0 X4 X5 +
```

$$\begin{aligned}
& 0.00634842 X_0 X_1 X_4 X_5 - 0.000177071 X_2 X_4 X_5 - 0.00636179 X_1 X_2 X_4 X_5 + \\
& 0.00562722 X_3 X_4 X_5 - 0.000346402 Y_0 Y_1 + 0.00448136 X_2 Y_0 Y_1 + 0.00115501 X_2 X_3 Y_0 Y_1 + \\
& 0.0000532277 X_2 X_3 X_4 Y_0 Y_1 - 4.65274 \times 10^{-6} X_2 X_5 Y_0 Y_1 + 0.00135462 X_2 X_4 X_5 Y_0 Y_1 - \\
& 0.000333484 X_1 Y_0 Y_2 - 0.000349657 Y_1 Y_2 - 0.00448136 X_0 Y_1 Y_2 - 0.00115501 X_0 X_3 Y_1 Y_2 - \\
& 0.0000532277 X_0 X_3 X_4 Y_1 Y_2 + 4.65274 \times 10^{-6} X_0 X_5 Y_1 Y_2 - 0.00135462 X_0 X_4 X_5 Y_1 Y_2 + \\
& 0.0000200195 X_1 Y_0 Y_3 - 0.00600159 X_4 Y_0 Y_3 - 0.0000200201 X_1 Y_2 Y_3 - 0.00811879 X_4 Y_2 Y_3 + \\
& 0.000605355 Y_0 Y_4 + 0.00218376 X_1 X_3 X_5 Y_0 Y_4 + 0.0000212508 X_3 X_5 Y_1 Y_4 + \\
& 0.000818909 Y_2 Y_4 - 0.00218383 X_1 X_3 X_5 Y_2 Y_4 + 0.00115327 Y_3 Y_4 - 0.0118593 X_5 Y_3 Y_4 - \\
& 6.82832 \times 10^{-6} X_0 X_5 Y_3 Y_4 - 0.00218371 X_0 X_1 X_5 Y_3 Y_4 + 0.0000425857 X_2 X_5 Y_3 Y_4 + \\
& 0.00218728 X_1 X_2 X_5 Y_3 Y_4 - 0.000359442 X_2 X_5 Y_0 Y_1 Y_3 Y_4 + 0.000359442 X_0 X_5 Y_1 Y_2 Y_3 Y_4 + \\
& 0.000135095 X_1 Y_0 Y_5 + 0.00605026 X_4 Y_0 Y_5 + 1.31465 \times 10^{-6} Y_1 Y_5 - 0.000135099 X_1 Y_2 Y_5 + \\
& 0.00818463 X_4 Y_2 Y_5 + 0.00562722 X_4 Y_3 Y_5 + 0.00262718 Y_4 Y_5 + 0.0118593 X_3 Y_4 Y_5 - \\
& 0.00207761 X_0 X_3 Y_4 Y_5 - 0.00286236 X_2 X_3 Y_4 Y_5 - 3.44924 \times 10^{-6} X_1 X_2 X_3 Y_4 Y_5 + \\
& 0.000359442 X_2 X_3 Y_0 Y_1 Y_4 Y_5 - 0.000359442 X_0 X_3 Y_1 Y_2 Y_4 Y_5 - 0.00208444 Y_0 Y_3 Y_4 Y_5 - \\
& 0.00281977 Y_2 Y_3 Y_4 Y_5 - 0.185375 Z_0 + 0.00317514 X_1 Z_0 - 0.000313619 X_2 Z_0 - \\
& 0.000349657 X_1 X_2 Z_0 - 0.0164168 X_3 Z_0 - 0.000593557 X_1 X_3 Z_0 - 0.000768553 X_3 X_4 Z_0 - \\
& 0.0000767563 X_1 X_3 X_4 Z_0 - 0.000758441 X_5 Z_0 + 0.0000287213 X_1 X_5 Z_0 - \\
& 0.02022 X_4 X_5 Z_0 - 0.000653789 X_1 X_4 X_5 Z_0 - 0.00238276 Y_1 Y_2 Z_0 - \\
& 0.000011104 X_3 Y_1 Y_2 Z_0 - 0.00628778 X_3 X_4 Y_1 Y_2 Z_0 - 0.0000557013 X_5 Y_1 Y_2 Z_0 - \\
& 0.000023046 X_4 X_5 Y_1 Y_2 Z_0 + 0.00628775 X_2 X_4 Y_1 Y_3 Z_0 - 0.000634219 X_2 Y_1 Y_4 Z_0 + \\
& 0.00524 X_5 Y_3 Y_4 Z_0 + 0.000176569 X_1 X_5 Y_3 Y_4 Z_0 + 3.44924 \times 10^{-6} X_5 Y_1 Y_2 Y_3 Y_4 Z_0 - \\
& 0.00633874 X_2 X_4 Y_1 Y_5 Z_0 - 0.00524 X_3 Y_4 Y_5 Z_0 - 0.00019782 X_1 X_3 Y_4 Y_5 Z_0 - \\
& 0.00218728 X_3 Y_1 Y_2 Y_4 Y_5 Z_0 + 0.00218383 X_2 Y_1 Y_3 Y_4 Y_5 Z_0 + 0.235213 Z_1 + \\
& 0.00168947 X_0 Z_1 + 0.00518865 X_2 Z_1 + 0.0644581 X_0 X_2 Z_1 - 2.04985 \times 10^{-6} X_0 X_3 Z_1 + \\
& 0.000159502 X_2 X_3 Z_1 - 1.45579 \times 10^{-6} X_0 X_3 X_4 Z_1 + 5.63004 \times 10^{-6} X_2 X_3 X_4 Z_1 + \\
& 0.00018075 X_0 X_5 Z_1 + 0.000252181 X_2 X_5 Z_1 + 0.00603326 X_0 X_4 X_5 Z_1 + \\
& 0.00836171 X_2 X_4 X_5 Z_1 + 0.0644557 Y_0 Y_2 Z_1 + 0.0000191089 Y_0 Y_3 Z_1 + \\
& 0.0000258501 Y_2 Y_3 Z_1 + 0.00208444 X_3 X_5 Y_0 Y_4 Z_1 + 0.00281977 X_3 X_5 Y_2 Y_4 Z_1 - \\
& 0.00207761 X_0 X_5 Y_3 Y_4 Z_1 - 0.00286236 X_2 X_5 Y_3 Y_4 Z_1 + 0.00012895 Y_0 Y_5 Z_1 + \\
& 0.000174441 Y_2 Y_5 Z_1 - 6.82832 \times 10^{-6} X_0 X_3 Y_4 Y_5 Z_1 + 0.0000425857 X_2 X_3 Y_4 Y_5 Z_1 - \\
& 0.186609 Z_0 Z_1 + 0.000313619 X_2 Z_0 Z_1 - 0.0180857 X_3 Z_0 Z_1 - 0.00083422 X_3 X_4 Z_0 Z_1 - \\
& 0.000726068 X_5 Z_0 Z_1 - 0.0221369 X_4 X_5 Z_0 Z_1 + 0.00575159 X_5 Y_3 Y_4 Z_0 Z_1 - \\
& 0.00575159 X_3 Y_4 Y_5 Z_0 Z_1 - 0.408535 Z_2 + 0.000313609 X_0 Z_2 - 0.00317514 X_1 Z_2 - \\
& 0.000346402 X_0 X_1 Z_2 - 0.0154095 X_3 Z_2 + 0.000593752 X_1 X_3 Z_2 - 0.00072171 X_3 X_4 Z_2 + \\
& 0.0000155702 X_1 X_3 X_4 Z_2 - 0.000733397 X_5 Z_2 - 0.0000274067 X_1 X_5 Z_2 - 0.0190046 X_4 X_5 Z_2 + \\
& 0.000715471 X_1 X_4 X_5 Z_2 + 0.00233908 Y_0 Y_1 Z_2 + 0.00628708 X_3 X_4 Y_0 Y_1 Z_2 + \\
& 0.0000557449 X_5 Y_0 Y_1 Z_2 + 9.86353 \times 10^{-6} X_4 X_5 Y_0 Y_1 Z_2 - 0.00628756 X_0 X_4 Y_1 Y_3 Z_2 + \\
& 0.0006342 X_0 Y_1 Y_4 Z_2 + 0.00492191 X_5 Y_3 Y_4 Z_2 - 0.00019782 X_1 X_5 Y_3 Y_4 Z_2 + \\
& 0.00633855 X_0 X_4 Y_1 Y_5 Z_2 - 0.00492191 X_3 Y_4 Y_5 Z_2 + 0.000176569 X_1 X_3 Y_4 Y_5 Z_2 + \\
& 0.00218371 X_3 Y_0 Y_1 Y_4 Y_5 Z_2 - 0.00218376 X_0 Y_1 Y_3 Y_4 Y_5 Z_2 + 0.162106 Z_0 Z_2 - \\
& 0.000335609 X_1 Z_0 Z_2 - 0.0000611861 X_4 Y_1 Y_3 Z_0 Z_2 + 6.17159 \times 10^{-6} Y_1 Y_4 Z_0 Z_2 + \\
& 0.0000616823 X_4 Y_1 Y_5 Z_0 Z_2 - 0.0000212508 Y_1 Y_3 Y_4 Y_5 Z_0 Z_2 - 0.410254 Z_1 Z_2 - \\
& 0.000313609 X_0 Z_1 Z_2 - 0.0176676 X_3 Z_1 Z_2 - 0.000889543 X_3 X_4 Z_1 Z_2 - 0.000692702 X_5 Z_1 Z_2 - \\
& 0.0216777 X_4 X_5 Z_1 Z_2 + 0.00564146 X_5 Y_3 Y_4 Z_1 Z_2 - 0.00564146 X_3 Y_4 Y_5 Z_1 Z_2 + \\
& 0.226558 Z_0 Z_1 Z_2 - 0.284094 Z_3 - 0.000110504 X_0 Z_3 + 0.0000311764 X_0 X_1 Z_3 + \\
& 0.000473615 X_2 Z_3 + 0.0000119845 X_1 X_2 Z_3 - 0.00171463 X_4 Z_3 + 0.000604774 X_0 X_4 Z_3 + \\
& 0.000823784 X_2 X_4 Z_3 + 0.00306375 X_5 Z_3 + 0.00262718 X_4 X_5 Z_3 - 0.00443537 X_2 Y_0 Y_1 Z_3 -
\end{aligned}$$

$$\begin{aligned}
& 0.0000466657 X_2 X_4 Y_0 Y_1 Z_3 + 0.00443537 X_0 Y_1 Y_2 Z_3 + 0.0000466657 X_0 X_4 Y_1 Y_2 Z_3 + \\
& 0.00633855 X_1 X_5 Y_0 Y_4 Z_3 + 0.0000616823 X_5 Y_1 Y_4 Z_3 - 0.00633874 X_1 X_5 Y_2 Y_4 Z_3 + \\
& 0.0661688 Y_4 Y_5 Z_3 - 0.00603326 X_0 Y_4 Y_5 Z_3 + 9.86353 \times 10^{-6} X_0 X_1 Y_4 Y_5 Z_3 - \\
& 0.00836171 X_2 Y_4 Y_5 Z_3 - 0.000023046 X_1 X_2 Y_4 Y_5 Z_3 + 0.00135462 X_2 Y_0 Y_1 Y_4 Y_5 Z_3 - \\
& 0.00135462 X_0 Y_1 Y_2 Y_4 Y_5 Z_3 + 0.0630371 Z_0 Z_3 + 0.00227945 X_1 Z_0 Z_3 + 0.00057444 X_4 Z_0 Z_3 + \\
& 0.0000318528 X_1 X_4 Z_0 Z_3 + 0.0000119845 Y_1 Y_2 Z_0 Z_3 + 0.000634787 X_4 Y_1 Y_2 Z_0 Z_3 - \\
& 0.02022 Y_4 Y_5 Z_0 Z_3 - 0.000715471 X_1 Y_4 Y_5 Z_0 Z_3 - 0.00636179 Y_1 Y_2 Y_4 Y_5 Z_0 Z_3 + \\
& 0.000110504 X_0 Z_1 Z_3 - 0.000473615 X_2 Z_1 Z_3 - 4.8746 \times 10^{-6} X_2 X_4 Z_1 Z_3 + \\
& 0.00605026 X_5 Y_0 Y_4 Z_1 Z_3 + 0.00818463 X_5 Y_2 Y_4 Z_1 Z_3 - 0.0000169999 X_0 Y_4 Y_5 Z_1 Z_3 + \\
& 0.000177071 X_2 Y_4 Y_5 Z_1 Z_3 + 0.0694463 Z_0 Z_1 Z_3 + 0.000643489 X_4 Z_0 Z_1 Z_3 - \\
& 0.0221369 Y_4 Y_5 Z_0 Z_1 Z_3 + 0.0591692 Z_2 Z_3 - 0.00227945 X_1 Z_2 Z_3 + 0.000536879 X_4 Z_2 Z_3 - \\
& 0.0000256813 X_1 X_4 Z_2 Z_3 + 0.0000311764 Y_0 Y_1 Z_2 Z_3 - 0.000634314 X_4 Y_0 Y_1 Z_2 Z_3 - \\
& 0.0190046 Y_4 Y_5 Z_2 Z_3 + 0.000653789 X_1 Y_4 Y_5 Z_2 Z_3 + 0.00634842 Y_0 Y_1 Y_4 Y_5 Z_2 Z_3 + \\
& 0.0678392 Z_1 Z_2 Z_3 + 0.000638266 X_4 Z_1 Z_2 Z_3 - 0.0216777 Y_4 Y_5 Z_1 Z_2 Z_3 + 0.127086 Z_4 - \\
& 0.0561302 X_3 Z_4 - 2.04985 \times 10^{-6} X_0 X_3 Z_4 + 0.000159502 X_2 X_3 Z_4 + 0.000011104 X_1 X_2 X_3 Z_4 - \\
& 0.000447423 X_5 Z_4 + 0.00018075 X_0 X_5 Z_4 - 0.0000557449 X_0 X_1 X_5 Z_4 + 0.000252181 X_2 X_5 Z_4 + \\
& 0.0000557013 X_1 X_2 X_5 Z_4 + 0.0068963 X_3 X_5 Z_4 - 0.00115501 X_2 X_3 Y_0 Y_1 Z_4 + \\
& 4.65274 \times 10^{-6} X_2 X_5 Y_0 Y_1 Z_4 + 0.00115501 X_0 X_3 Y_1 Y_2 Z_4 - 4.65274 \times 10^{-6} X_0 X_5 Y_1 Y_2 Z_4 + \\
& 0.0000191089 Y_0 Y_3 Z_4 + 0.0000258501 Y_2 Y_3 Z_4 + 0.00012895 Y_0 Y_5 Z_4 + \\
& 0.000174441 Y_2 Y_5 Z_4 + 0.000587714 Y_3 Y_5 Z_4 + 0.0164168 X_3 Z_0 Z_4 + 0.000593752 X_1 X_3 Z_0 Z_4 + \\
& 0.000758441 X_5 Z_0 Z_4 - 0.0000274067 X_1 X_5 Z_0 Z_4 + 0.0000311241 X_3 Y_1 Y_2 Z_0 Z_4 + \\
& 0.0001908 X_5 Y_1 Y_2 Z_0 Z_4 - 0.0000200201 X_2 Y_1 Y_3 Z_0 Z_4 - 0.000135099 X_2 Y_1 Y_5 Z_0 Z_4 + \\
& 0.0000211588 X_0 X_3 Z_1 Z_4 - 0.000133652 X_2 X_3 Z_1 Z_4 - 0.0000517994 X_0 X_5 Z_1 Z_4 - \\
& 0.0000777401 X_2 X_5 Z_1 Z_4 + 0.0180857 X_3 Z_0 Z_1 Z_4 + 0.000726068 X_5 Z_0 Z_1 Z_4 + \\
& 0.0154095 X_3 Z_2 Z_4 - 0.000593557 X_1 X_3 Z_2 Z_4 + 0.000733397 X_5 Z_2 Z_4 + \\
& 0.0000287213 X_1 X_5 Z_2 Z_4 - 0.0000198838 X_3 Y_0 Y_1 Z_2 Z_4 - 0.00019084 X_5 Y_0 Y_1 Z_2 Z_4 + \\
& 0.0000200195 X_0 Y_1 Y_3 Z_2 Z_4 + 0.000135095 X_0 Y_1 Y_5 Z_2 Z_4 + 1.31465 \times 10^{-6} Y_1 Y_5 Z_0 Z_2 Z_4 + \\
& 0.0176676 X_3 Z_1 Z_2 Z_4 + 0.000692702 X_5 Z_1 Z_2 Z_4 - 0.277122 Z_3 Z_4 - 0.0000509732 X_0 Z_3 Z_4 - \\
& 0.0000311973 X_0 X_1 Z_3 Z_4 + 0.000554154 X_2 Z_3 Z_4 + 0.0000743536 X_1 X_2 Z_3 Z_4 - \\
& 0.00306375 X_5 Z_3 Z_4 - 0.0044347 X_2 Y_0 Y_1 Z_3 Z_4 + 0.0044347 X_0 Y_1 Y_2 Z_3 Z_4 + \\
& 0.0630377 Z_0 Z_3 Z_4 + 0.00227916 X_1 Z_0 Z_3 Z_4 + 0.0000743536 Y_1 Y_2 Z_0 Z_3 Z_4 + \\
& 0.0000509732 X_0 Z_1 Z_3 Z_4 - 0.000554154 X_2 Z_1 Z_3 Z_4 + 0.0694454 Z_0 Z_1 Z_3 Z_4 + \\
& 0.0591701 Z_2 Z_3 Z_4 - 0.00227916 X_1 Z_2 Z_3 Z_4 - 0.0000311973 Y_0 Y_1 Z_2 Z_3 Z_4 + \\
& 0.0678396 Z_1 Z_2 Z_3 Z_4 - 0.281932 Z_5 + 0.00175937 X_0 Z_5 - 0.00198685 X_0 X_1 Z_5 + \\
& 0.00307938 X_2 Z_5 + 0.00197102 X_1 X_2 Z_5 - 0.00147663 X_3 Z_5 + 0.00171463 X_4 Z_5 + \\
& 0.000634314 X_0 X_1 X_4 Z_5 - 4.8746 \times 10^{-6} X_2 X_4 Z_5 - 0.000634787 X_1 X_2 X_4 Z_5 + \\
& 0.00115327 X_3 X_4 Z_5 + 0.00163285 X_2 Y_0 Y_1 Z_5 + 0.0000466657 X_2 X_4 Y_0 Y_1 Z_5 - \\
& 0.00163285 X_0 Y_1 Y_2 Z_5 - 0.0000466657 X_0 X_4 Y_1 Y_2 Z_5 - 0.00628756 X_1 X_3 Y_0 Y_4 Z_5 - \\
& 0.0000611861 X_3 Y_1 Y_4 Z_5 + 0.00628775 X_1 X_3 Y_2 Y_4 Z_5 + 0.00165752 Y_3 Y_4 Z_5 + \\
& 1.45579 \times 10^{-6} X_0 Y_3 Y_4 Z_5 + 0.00628708 X_0 X_1 Y_3 Y_4 Z_5 - 5.63004 \times 10^{-6} X_2 Y_3 Y_4 Z_5 - \\
& 0.00628778 X_1 X_2 Y_3 Y_4 Z_5 + 0.0000532277 X_2 Y_0 Y_1 Y_3 Y_4 Z_5 - 0.0000532277 X_0 Y_1 Y_2 Y_3 Y_4 Z_5 + \\
& 0.0688291 Z_0 Z_5 - 0.00377663 X_1 Z_0 Z_5 - 0.00057444 X_4 Z_0 Z_5 - 0.0000256813 X_1 X_4 Z_0 Z_5 + \\
& 0.00197102 Y_1 Y_2 Z_0 Z_5 - 0.000768553 Y_3 Y_4 Z_0 Z_5 - 0.0000155702 X_1 Y_3 Y_4 Z_0 Z_5 - \\
& 0.00175937 X_0 Z_1 Z_5 - 0.00307938 X_2 Z_1 Z_5 + 0.000604774 X_0 X_4 Z_1 Z_5 + \\
& 0.000823784 X_2 X_4 Z_1 Z_5 - 0.00600159 X_3 Y_0 Y_4 Z_1 Z_5 - 0.00811879 X_3 Y_2 Y_4 Z_1 Z_5 + \\
& 0.00600013 X_0 Y_3 Y_4 Z_1 Z_5 + 0.00812442 X_2 Y_3 Y_4 Z_1 Z_5 + 0.0636474 Z_0 Z_1 Z_5 - \\
& 0.000643489 X_4 Z_0 Z_1 Z_5 - 0.00083422 Y_3 Y_4 Z_0 Z_1 Z_5 + 0.0670048 Z_2 Z_5 +
\end{aligned}$$

$$\begin{aligned}
& 0.00377663 X_1 Z_2 Z_5 - 0.000536879 X_4 Z_2 Z_5 + 0.0000318528 X_1 X_4 Z_2 Z_5 - \\
& 0.00198685 Y_0 Y_1 Z_2 Z_5 - 0.00072171 Y_3 Y_4 Z_2 Z_5 + 0.0000767563 X_1 Y_3 Y_4 Z_2 Z_5 + \\
& 0.0600449 Z_1 Z_2 Z_5 - 0.000638266 X_4 Z_1 Z_2 Z_5 - 0.000889543 Y_3 Y_4 Z_1 Z_2 Z_5 + 0.139703 Z_3 Z_5 - \\
& 0.000547046 X_4 Z_3 Z_5 + 0.0006342 X_1 Y_0 Y_4 Z_3 Z_5 + 6.17159 \times 10^{-6} Y_1 Y_4 Z_3 Z_5 - \\
& 0.000634219 X_1 Y_2 Y_4 Z_3 Z_5 + 0.000605355 Y_0 Y_4 Z_1 Z_3 Z_5 + 0.000818909 Y_2 Y_4 Z_1 Z_3 Z_5 - \\
& 0.288942 Z_4 Z_5 - 0.0000227489 X_0 Z_4 Z_5 - 0.00012608 X_0 X_1 Z_4 Z_5 + 0.000676671 X_2 Z_4 Z_5 + \\
& 0.000103924 X_1 X_2 Z_4 Z_5 + 0.00147663 X_3 Z_4 Z_5 + 0.00227721 X_2 Y_0 Y_1 Z_4 Z_5 - \\
& 0.00227721 X_0 Y_1 Y_2 Z_4 Z_5 + 0.0694442 Z_0 Z_4 Z_5 - 0.00443237 X_1 Z_0 Z_4 Z_5 + \\
& 0.000103924 Y_1 Y_2 Z_0 Z_4 Z_5 + 0.0000227489 X_0 Z_1 Z_4 Z_5 - 0.000676671 X_2 Z_1 Z_4 Z_5 + \\
& 0.0630389 Z_0 Z_1 Z_4 Z_5 + 0.0678368 Z_2 Z_4 Z_5 + 0.00443237 X_1 Z_2 Z_4 Z_5 - \\
& 0.00012608 Y_0 Y_1 Z_2 Z_4 Z_5 + 0.0591748 Z_1 Z_2 Z_4 Z_5 + 0.147366 Z_3 Z_4 Z_5
\end{aligned}$$

Removelds

```

setTmpFile[".1 1 0 0 0 0 0"];
GetPauliString["tmp.txt"]
setTmpFile[".1 1 0 0 0 0 0"];
GetPauliString["tmp.txt", "RemoveIds" → False]

0.1 X0

0.1 Id1 Id2 Id3 Id4 Id5 X0

```

numQubits

```

setTmpFile[".1 1 0 0"];
GetPauliString["tmp.txt", 10]

setTmpFile[".1 1 0 0"];
GetPauliString["tmp.txt", 10, "RemoveIds" → True]

0.1 Id1 Id2 Id3 Id4 Id5 Id6 Id7 Id8 Id9 X0

0.1 X0

```

```
GetPauliString["https://qtechtheory.org/hamil_6qbLiH.txt", 20][[;; 10]]
-6.52209 Id0 Id1 Id2 Id3 Id4 Id5 Id6 Id7 Id8 Id9 Id10 Id11
  Id12 Id13 Id14 Id15 Id16 Id17 Id18 Id19 - 0.00168947 Id1 Id2 Id3 Id4
  Id5 Id6 Id7 Id8 Id9 Id10 Id11 Id12 Id13 Id14 Id15 Id16 Id17 Id18 Id19 X0 +
0.000335609 Id0 Id2 Id3 Id4 Id5 Id6 Id7 Id8 Id9 Id10 Id11 Id12 Id13 Id14 Id15
  Id16 Id17 Id18 Id19 X1 + 0.00233908 Id2 Id3 Id4 Id5 Id6 Id7 Id8 Id9 Id10
  Id11 Id12 Id13 Id14 Id15 Id16 Id17 Id18 Id19 X0 X1 - 0.00518865 Id0 Id1 Id3
  Id4 Id5 Id6 Id7 Id8 Id9 Id10 Id11 Id12 Id13 Id14 Id15 Id16 Id17 Id18 Id19 X2 -
2.32678 × 10-6 Id1 Id3 Id4 Id5 Id6 Id7 Id8 Id9 Id10 Id11 Id12 Id13 Id14
  Id15 Id16 Id17 Id18 Id19 X0 X2 - 0.00238276 Id0 Id3 Id4 Id5 Id6
  Id7 Id8 Id9 Id10 Id11 Id12 Id13 Id14 Id15 Id16 Id17 Id18 Id19 X1 X2 -
0.000333484 Id3 Id4 Id5 Id6 Id7 Id8 Id9 Id10 Id11 Id12 Id13 Id14 Id15 Id16
  Id17 Id18 Id19 X0 X1 X2 + 0.0561302 Id0 Id1 Id2 Id4 Id5 Id6 Id7 Id8 Id9 Id10
  Id11 Id12 Id13 Id14 Id15 Id16 Id17 Id18 Id19 X3 + 0.0000211588 Id1 Id2 Id4
  Id5 Id6 Id7 Id8 Id9 Id10 Id11 Id12 Id13 Id14 Id15 Id16 Id17 Id18 Id19 X0 X3
```

targets

```
setTmpFile["3 1 2 3"];
GetPauliString["tmp.txt", {5, 6, 7}]
3 X5 Y6 Z7

setTmpFile["3 1 2 3\n3 3 2 1"];
GetPauliString["tmp.txt", {5, 6, 7}]
3 X7 Y6 Z5 + 3 X5 Y6 Z7

GetPauliString[
  "https://qtechtheory.org/hamil_6qbLiH.txt", {9, 8, 7, 6, 5, 4}][[;; 10]]
-6.52209 Id9 + 0.000447423 X4 + 0.000547046 X5 +
  0.0661688 X4 X5 + 0.0561302 X6 - 0.00630859 X4 X6 + 0.00165752 X5 X6 +
  0.00562722 X4 X5 X6 - 0.00518865 X7 - 0.0000777401 X4 X7
```

Errors

Matrix

```
GetPauliString @ {{1, 2, 3}}
GetPauliString @ IdentityMatrix[6]
```

⋯ GetPauliString: Matrix must be square with a power-of-2 number of rows and columns.

\$Failed

⋯ GetPauliString: Matrix must be square with a power-of-2 number of rows and columns.

\$Failed

```
m = RandomInteger[{-10, 10}, {2^3, 2^3}];
GetPauliString[m, 2]
```

... **GetPauliString**: The specified number of qubits (2) was fewer than that suggested (3) by the matrix's dimension.

\$Failed

```
m = RandomInteger[{-10, 10}, {4, 4}];
GetPauliString[m, {0}]
```

... **GetPauliString**: A different number of target qubits was given (1) than exists in the Pauli string (2).

\$Failed

```
m = RandomInteger[{-10, 10}, {4, 4}];
GetPauliString[m, {}]
GetPauliString[m, 2, {}]
GetPauliString[m, {}, 2]
```

... **GetPauliString**: Optional list of target qubits must not be empty.

\$Failed

... **GetPauliString**: Optional list of target qubits must not be empty.

\$Failed

... **GetPauliString**: Optional list of target qubits must not be empty.

\$Failed

```
m = RandomInteger[{-10, 10}, {4, 4}];
GetPauliString[m, 4, {1, 2, 3}]
```

... **GetPauliString**: A different number of target qubits was given (3) than exists in the Pauli string (4).

\$Failed

```
GetPauliString[m, "BadOption" → True]
```

... **OptionValue**: Unknown option BadOption for GetPauliString.

$$\begin{aligned} & \frac{13 \text{Id}_1}{4} + \frac{15 X_0}{4} + 2 X_1 + \frac{21 X_0 X_1}{4} + \frac{23 \text{i} Y_0}{4} + \frac{9}{4} \text{i} X_1 Y_0 + 6 \text{i} Y_1 + \frac{7}{4} \text{i} X_0 Y_1 + \\ & \frac{5 Y_0 Y_1}{4} + \frac{11 Z_0}{4} + 2 X_1 Z_0 - 2 \text{i} Y_1 Z_0 - \frac{7 Z_1}{4} + \frac{13 X_0 Z_1}{4} - \frac{15}{4} \text{i} Y_0 Z_1 + \frac{3 Z_0 Z_1}{4} \end{aligned}$$

Index

```
GetPauliString[-1]
```

... **GetPauliString**: Index must be positive or zero.

\$Failed

```
GetPauliString[1, 0]
```

... **GetPauliString**: Invalid arguments. See ?GetPauliString

```
$Failed
```

```
GetPauliString[123, 2]
```

... **GetPauliString**: The given index (123) exceeds the maximum possible ($15 = 4^2 - 1$) for the given number of Pauli operators (2).

```
$Failed
```

```
GetPauliString[123, {2, 4}]
```

... **GetPauliString**: A different number of target qubits was given (2) than exists in the Pauli string (4).

```
$Failed
```

```
GetPauliString[123, blah]
```

... **GetPauliString**: Invalid arguments. See ?GetPauliString

```
$Failed
```

```
GetPauliString[3, 1, "BadOption" → True]
```

... **OptionValue**: Unknown option BadOption for GetPauliString.

```
Z0
```

Digits

```
GetPauliString[{1, 0, 0}, {1, 2, 3, 4}]
```

... **GetPauliString**: A different number of target qubits was given (4) than exists in the Pauli string (–Infinity).

```
$Failed
```

```
GetPauliString[{4, 0, 0}]
```

```
GetPauliString[{-1, 0, 0}]
```

```
QuEST`Private`getPauliStringFromDigits[{4, 0, 0}, True]
```

```
QuEST`Private`getPauliStringFromDigits[{-1, 0, 0}, True]
```

```
GetPauliString[{a, b, c}]
```

... **GetPauliString**: Invalid arguments. See ?GetPauliString

```
$Failed
```

```
GetPauliString[{0, 0, 0}, 2]
```

... **GetPauliString**: The overridden number of qubits was fewer than the number of given digits.

```
$Failed
```

```
GetPauliString[{0, 0, 0}, 0]
```

... **GetPauliString**: Invalid arguments. See ?GetPauliString

```
$Failed
```

Address

```
setTmpFile["eh"];
GetPauliString["tmp.txt"]
```

... **GetPauliString**: Parsing the file failed due to the below error:

... **ReadList**: Invalid real number found when reading from tmp.txt.

\$Failed

```
setTmpFile[".1 1 0 0 0 0 0"];
GetPauliString["tmp.txt", 4]
```

... **GetPauliString**: The specified number of qubits (4) was fewer than that encoded in the file (6).

\$Failed

```
GetPauliString["https://qtechtheory.org/hamil_6qbLiH.txt", {9, 8, 7, 5, 4}]
```

... **GetPauliString**: A different number of target qubits was given (5) than exists in the Pauli string (6).

\$Failed

```
GetPauliString["https://qtechtheory.org/hamil_6qbLiH.txt", {9, 9, 9, 9, 9, 9}]
GetPauliString["https://qtechtheory.org/hamil_6qbLiH.txt",
  {-1, -2, -3, -4, -5, -6}]
```

... **GetPauliString**: The list of target qubits must be non-negative and unique.

\$Failed

... **GetPauliString**: The list of target qubits must be non-negative and unique.

\$Failed

```
GetPauliString["https://qtechtheory.org/hamil_6qbLiH.txt", -1]
```

... **GetPauliString**: Invalid arguments. See ?GetPauliString

\$Failed

```
GetPauliString[
  "https://qtechtheory.org/hamil_6qbLiH.txt", "BadOption" → True][[;; 5]]
```

... **OptionValue**: Unknown option BadOption for GetPauliString.

$-6.52209 \text{ Id}_0 - 0.00168947 X_0 + 0.000335609 X_1 + 0.00233908 X_0 X_1 - 0.00518865 X_2$