From classical to good quantum LDPC codes.

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Today.

- Brif Review of Coding.

Today.

- Brif Review of Coding. Tanner and Expander codes.

Today.

- Brif Review of Coding. Tanner and Expander codes.
- Quantum Error Correction Codes.

Today.

- Brif Review of Coding. Tanner and Expander codes.
- Quantum Error Correction Codes.
- Good Classical Locally Testabile Codes and Good Qauntum LDPC.

Classical Vs Quantum Encoding.

Classical:

110101

Quantum:

110101

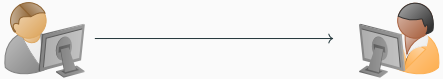
Classical Vs Quantum Encoding.

Classical:

100101

Quantum:

100101



Classical Vs Quantum Encoding.

Classical:
10010111010111010 5
100101

Quantum:
10010111010111010 5
100101

Classical Vs Quantum Encoding.

Classical:
10010111010111010 5
100101

Quantum:
10010111010111010 5
100101

Classical Vs Quantum Encoding.

Classical:

$|10010111010111 0101\rangle$

$|100101\rangle$

Quantum:

$|10010111010111 0101\rangle$

$|100101\rangle$

Good Classical LDPC Code.

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Good Classical LDPC Code.

Quantum Encoding.

Quantum Encoding.

Quantum Encoding.

Idea I - (Uncertainty) Clouds as States.

CSS Code.

'Idea II' - Tanner Checks are 'Too Much' Interdependence.

'Idea III' - Impossibility of Both C_X, C_Z being Good.

Quantum Tanner Code Construction.

Proving Strategy.