### **Encontros Matemáticos apresenta**

### Computação Quântica

Pedro Maciel Xavier
pedromxavier@poli.ufrj.br
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IM-UFRJ

### Computação Digital

Computação Quântica

Trapped-ion

Fótons

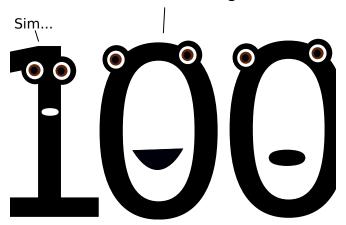
Algoritmos

01001011000010101010101011010101111111011010
100100011011100110100101000010101101101
011100111001110000001100010111111100100
0011000101010001000100110010111111110101
1011100000011100110001110110011101000101
10100000101100100000001011010011100111101111
101101101001010101011111100000110111111
10001100000010111000001001101110101010
10011000000000000001110111011010010110000
1100011100000101011100011100101011101011101111
01101001100000110001101001011000100110011101111
00011000001010001111101011111101011010010000
01001000011111101011011011010010111111010
0001101101010110111000011111111000011111
001011111110011001101010101010101010000110000
110100000000101101101101111000011000101110000
101000110001000011100110110110110000111000101
10011111011010101100101101101010100000101
00101111001100110010000110111010000101101111
0111100100101100011000010011000010111111
10111111001111011100000000101100101100101
01111010000001101110101111111010010110000
001110101000001001110110101110011111001110000
01001011101011111110000010011000101100101
0101001010111111100100101110010010111111
101011001100001110000010001111011011011
01000010011010000000010011011000111101111
011000001110001000110110111010100100101111
010110000110011110110110010010010010010
001110011101001001001001001000100110000101
00111000111111001000100010111101110101001001111
0101011110101100000101001111000000010000
01011000011101001101101001001101000000101
10000110111101110000011111110101001110000
0011000101000011100001110001110011100
111000010110111000010010010010000000001110001101101101101111
111011101001110001101000010111000011111010
001011011111110011110001011001001111000101
1111100100001100110010011001000000111111

### 

## Não! Sim Não Sim! Uhum

Finalmente! É o meu grande dia!



# SIM!

A problem has been detected and Windows has been shut down to prevent damage to your computer.

The problem seems to be caused by the following file: SPCMDCON.SYS

### PAGE\_FAULT\_IN\_NONPAGED\_AREA

these steps: Check to make sure any new hardware or software is properly installed. If this is a new installation, ask your hardware or software manufacturer

If this is the first time you've seen this Stop error screen, restart your computer. If this screen appears again, follow

If problems continue, disable or remove any newly installed hardware or software. Disable BIOS memory options such as caching or shadowing. If you need to use Safe Mode to remove or disable components, restart your computer, press F8 to select Advanced Startup Options, and then select Safe Mode.

Technical information:

for any Windows updates you might need.

\*\*\* STOP: 0x00000050 (0xFD3094C2,0x00000001,0xFBFE7617,0x00000000)

\*\*\* SPCMDCON.SYS - Address FBFE7617 base at FBFE5000, DateStamp 3d6dd67c

### Computação Digital

### bits

### Sobre os bits:

- Eles moram em  $\mathbb{Z}_2$
- Formam vetores em  $\mathbb{Z}_2^n$ , onde cada  $\vec{a} = (a_1, a_2, \dots, a_n) \in \mathbb{Z}_2^n$  representa um valor entre 00...0 = 0 e  $11...1 = 2^n 1$
- Realizamos operações *Booleanas* com eles: ¬, ∧, ∨, ⊕.



$$\neg: \mathbb{Z}_2 \to \mathbb{Z}_2$$
$$a \to \bar{a} = (1 - a)$$

George Boole 1815 - 1864



### Portas Lógicas

### Arquitetura de Von Neuman



John Von Neuman 1903 - 1957

### Fenômenos Quânticos



Richard Feynman 1918 - 1988

Computação Quântica

### **Trapped-ion**

Oi íon aprisionado

$$|\hspace{.1cm}\rangle = rac{|\hspace{.1cm}\rangle + |\hspace{.1cm}\rangle}{\sqrt{2}}$$

### Algoritmo de Grover

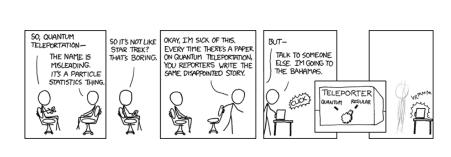


Lov Grover Bell Labs

### Algoritmo de Shor



Peter Shor MIT



### **Teletransporte Quântico**



Introduction to topological quantum computation with non-Abelian anyons, FIELD, B. & SIMULA, T., School of Physics and Astronomy, Monash University, Victoria 3800, Australia.