

# EINFÜHRUNG IN DIE QUANTENRECHNUNG

## Bits und Qubits

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P&GG Monotechnische Anstalt

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## 1 Einfache Computadoras

- Mathematik
- Architektur

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In decimal notation,

$$1572_{10} = 1 \times 10^3 + 5 \times 10^2 + 7 \times 10^1 + 2 \times 10^0$$

Going from decimal to binary notation,

$$\begin{aligned} 27_{10} &= 16 + 8 + 2 + 1 \\ &= 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 \\ &= 11011_2 \end{aligned}$$

From binary to decimal,

$$\begin{aligned} 1001101_2 &= 1 \times 2^6 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^0 \\ &= 64 + 8 + 4 + 1 \\ &= 77_{10} \end{aligned}$$

$$2^0 = 1$$

$$2^1 = 2$$

$$2^2 = 4$$

$$2^3 = 8$$

$$2^4 = 16$$

$$2^5 = 32$$

$$2^6 = 64$$

$$2^7 = 128$$

$$2^8 = 256$$

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# Logic Gates



**AND**

A	B	Output
0	0	0
0	1	0
1	0	0
1	1	1



**OR**

A	B	Output
0	0	0
0	1	1
1	0	1
1	1	1



**XOR**

A	B	Output
0	0	0
0	1	1
1	0	1
1	1	0



**NAND**

A	B	Output
0	0	1
0	1	1
1	0	1
1	1	0



**NOR**

A	B	Output
0	0	1
0	1	0
1	0	0
1	1	0



**XNOR**

A	B	Output
0	0	1
0	1	0
1	0	0
1	1	1



# Adder

