

Title

Sommerakademie in Leysin
AG 2 – Effizientes Rechnen

Karl-Felix Müller

Georg-August University Göttingen

August 2016



Outline

- ① Transistors: general properties
A brief overview
- ② CMOS components
- ③ Logical units
- ④ Energy dissipation
- ⑤ Mathematical models
- ⑥ Gate leakage
- ⑦ Architectural solutions

What is a transistor

- semiconductor device
- smallest unit in modern electronics
- used to guide the amplitude of electric current
- largest transistor count in a commercially available processor (2016):
7.2 billion (Intel Broadwell-EP Xeon)

Different transistor types

- bipolar junction transistor (BJT)
- field-effect transistor (FET)
- junction field-effect transistor (JFET)
- metal-oxide-semiconductor field-effect transistor (MOSFET)
- complementary metal-oxide-semiconductor field-effect transistor (CMOS)

- 1 Transistors: general properties
A brief overview
- 2 CMOS components**
- 3 Logical units
- 4 Energy dissipation
- 5 Mathematical models
- 6 Gate leakage
- 7 Architectural solutions

- 1 Transistors: general properties
A brief overview
- 2 CMOS components
- 3 Logical units**
- 4 Energy dissipation
- 5 Mathematical models
- 6 Gate leakage
- 7 Architectural solutions

- 1 Transistors: general properties
A brief overview
- 2 CMOS components
- 3 Logical units
- 4 Energy dissipation**
- 5 Mathematical models
- 6 Gate leakage
- 7 Architectural solutions

- 1 Transistors: general properties
A brief overview
- 2 CMOS components
- 3 Logical units
- 4 Energy dissipation
- 5 Mathematical models**
- 6 Gate leakage
- 7 Architectural solutions

- 1 Transistors: general properties
A brief overview
- 2 CMOS components
- 3 Logical units
- 4 Energy dissipation
- 5 Mathematical models
- 6 Gate leakage**
- 7 Architectural solutions

- 1 Transistors: general properties
A brief overview
- 2 CMOS components
- 3 Logical units
- 4 Energy dissipation
- 5 Mathematical models
- 6 Gate leakage
- 7 Architectural solutions**

