

Wrap-up-teurs view

Multiscale and field effect approaches

The bridge to design

Physics

Engineering

nanometer region

submicron to micron region

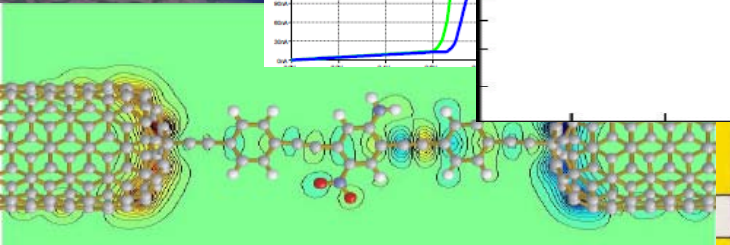
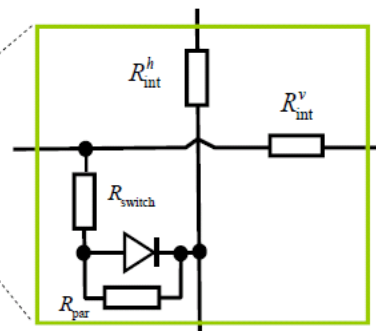
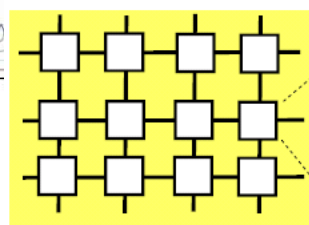
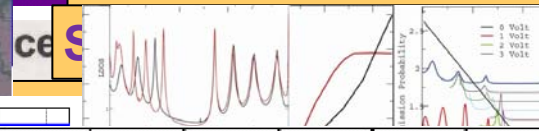
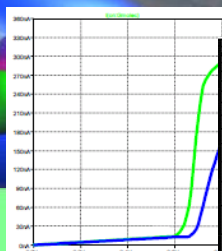
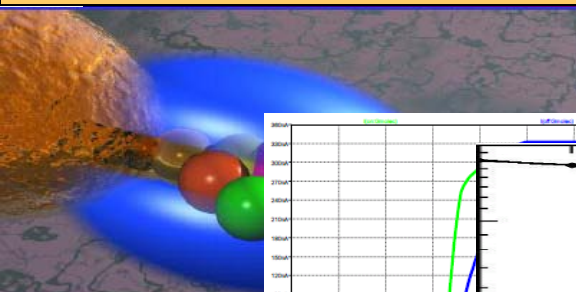
Micron to millimeter regions

Beyond Moore device candidates

Multi scale models

System level based and circuit models

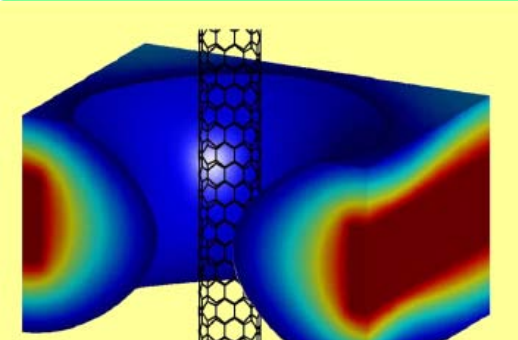
Simulation and modeling tools



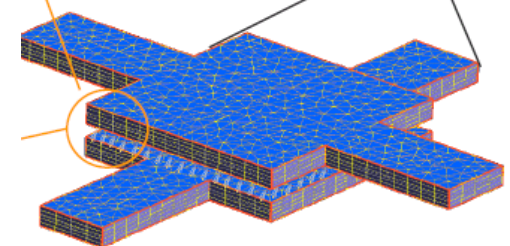
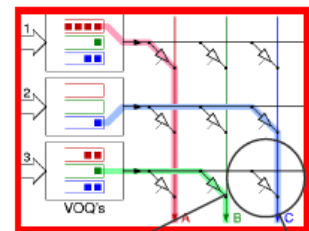
transport

Planar double gate

Time



Vertical CNT transistor



Circuit level

We can simulate transport in molecular structures

but

the simulation of realistic systems, especially in terms of the contacts and in general the coupling with the external environment is still a problem

Requirements

- The $I_{\text{on}}/I_{\text{on}(1/2)}$ should be 10^4
 - The junction should deliver high currents ideally below 6 V.
 - Stability with time (10 years) and to electri
-

Field coupling

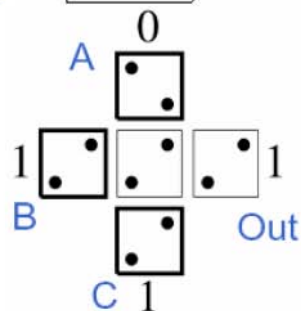
Binary wire 1



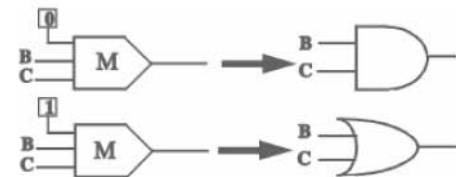
Inverter



Majority gate



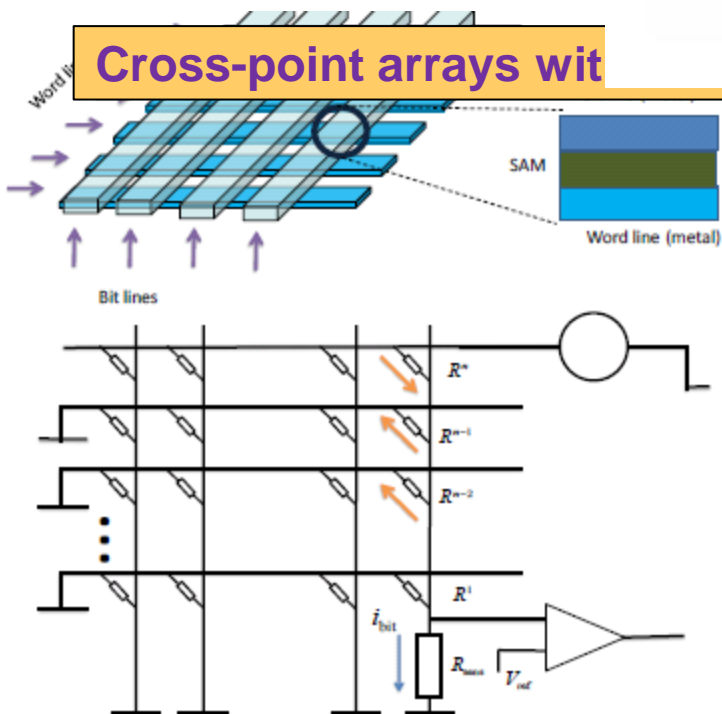
A	B	C	Output
0	0	0	0
0	0	1	0
0	1	1	1
0	1	0	0
1	1	0	1
1	1	1	1
1	0	1	1
1	0	0	0



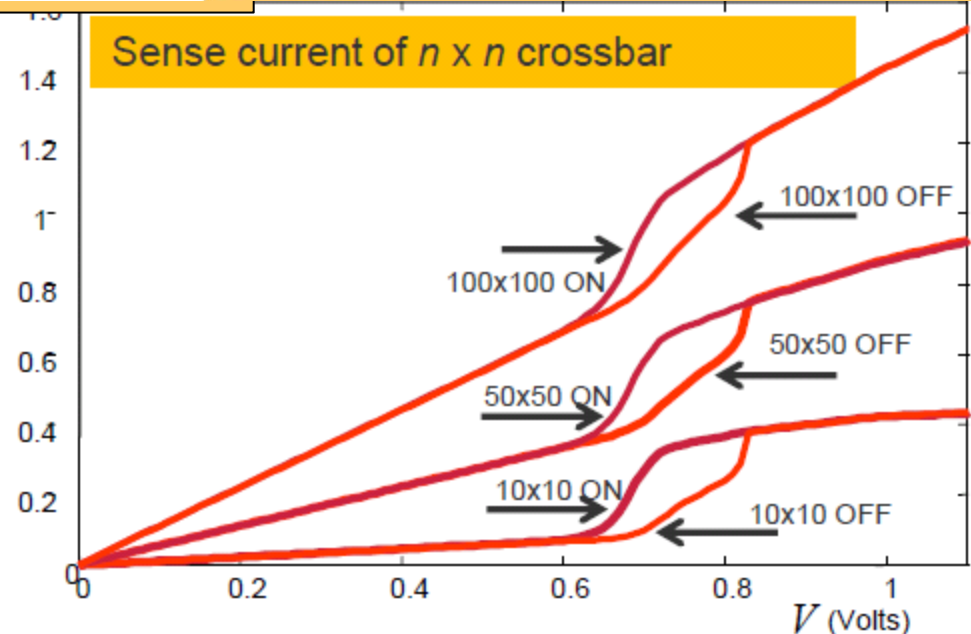
Programmable 2-input AND or OR gate.

With the majority gate, all Boolean logic functions could be realized

Cross-point arrays with



Sense current of $n \times n$ crossbar



Things that have been discussed

- Who will be the future EDA/CAD vendors? What about MEMS?
 - If there is a need for tools, it will come.
- NanoMagnets seems to be very interesting. What about Nonconductive Molecules?
 - Molecules are an option for the future.
- Are Carbon NanoTubes are dead?
 - No, it depends on the application.
 - Printed CNT transistors are extremely interesting.
 - CNT-network works good as well.
 - Based on Nanotube which are good example
- There are promising concepts of magnetic amplifiers
 - Cargoso models developed before technology was there
- What about accuracy of single electron devices? There are some promising results