



UNIVERSITA' DEGLI STUDI DI PARMA

Dipartimento di Fisica e Scienza della Terra

SEMINARIO DI DIPARTIMENTO

Atomic scale nanoelectronics: advancements and directions

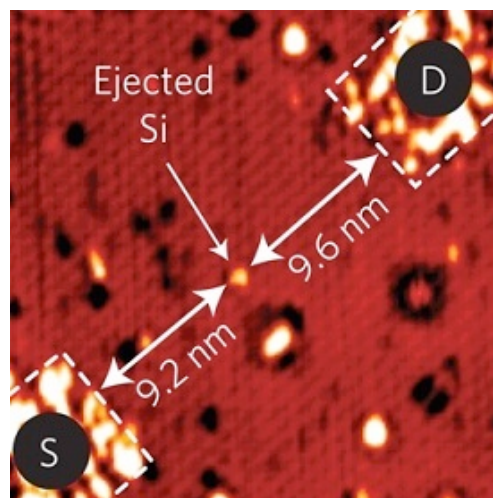
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Abstract:

I review the theoretical and experimental advances in nanometric-scale devices and single atom systems. Few electron devices are currently obtained either by fabricating nanometric-scale semiconductor FinFETs and quantum dots, or by doping them with few impurity atoms. Such nanometric devices, originally realized by employing either pre-industrial or laboratory processes, are now being fabricated in commercial 14 nm node architecture. They have lead, starting from the 90's, to the observation of classical non-linear effects, to spin and orbital-related quantum effects, manipulation of few qubits and to many-body quantum effects. I highlight high points and major constraints and limitations to state-of-the-art fabrication based on lithography and doping, and their possible integration with different methods such as self-assembly, inspired by biology and natural systems.

"At the atomic level, we have new kinds of forces and new kinds of possibilities, new kinds of effects. The problems of manufacture and reproduction of materials will be quite different. I am, as I said, inspired by the biological phenomena in which chemical forces are used in repetitious fashion to produce all kinds of weird effects (one of which is the author)". R. Feynman, 1957



Mercoledì 3 dicembre – ore 16.30
Aula Newton – Plesso Fisico