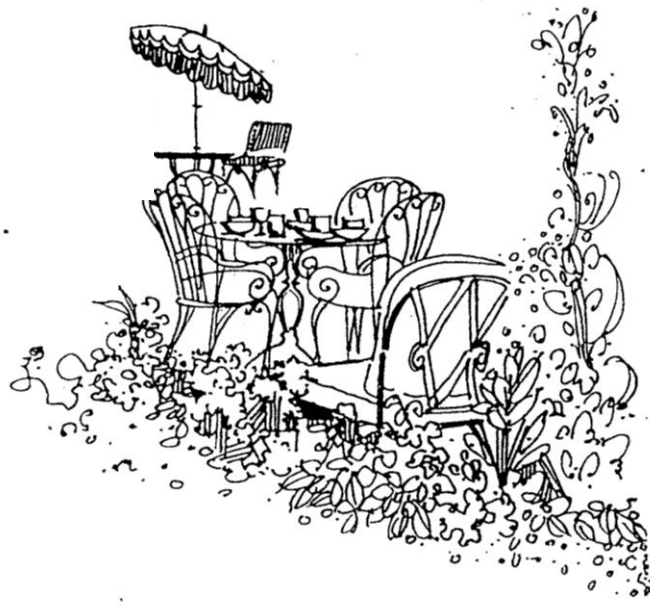
Chez Pierre

Presents ...

Monday, May 9, 2011
12:00pm
MIT Room 4-331



Chris Regan

University of California – Los Angeles

"Space quantization and the graphene transistor"

In 1928 Dirac showed that the origin of the electron's spin, a "classically indescribable" internal quantum number, is intimately related to the structure of spacetime. The low-energy electronic excitations of graphene also have an internal quantum number, called pseudospin, that results from the geometric properties of graphene's honeycomb lattice. As part of an effort to build graphene transistors, we have calculated how graphene's low-energy electronic excitations interact with photons. This calculation reveals that graphene's pseudospin is connected to a real, half-integer spin angular momentum. Comparison with Dirac's theory further suggests two possibilities, depending on whether these spins have related origins. Either the intrinsic spin of the electron is also the low-energy signature of non-trivial quantized space, or lattice-generated spin in graphene represents a second, experimentally-accessible type of quantum mechanical angular momentum with no classical analogue.