Electronic Structure Theory
Mini-colloquium 36

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Density functional theory is one of the most popular methods for calculating structural, electronic[1] and dynamical properties of solids[2, 3]. Despite its huge success, it is far from being perfect. For example it fails in the regime of intermediate to strong correlation. In the last years several methodological developments have been achieved to include correlation effects beyond density functional theory. The success of these methods has to be judged on their abilities to solve practical problems and applications.

The scope of the present minicolloquium are: (i) to present new methodological developments in first-principles electronic-structures and (ii) to illustrate practical applications to material science.

The colloquium will not be limited to the role of electron-electron interaction effects on the electronic structure, but an important part will be devoted to the effects of correlation on vibrational spectra and on the electron-phonon interaction.

Application to technologically relevant materials will be considered.

A not exaustive list will include superhard materials, carbon-based systems, transition metal dichalcogenides, two dimensional nanostructures and superconductors.

**References**