Mott physics: from basic concepts to iron superconductors.

In the talks I will discuss several aspects of Mott physics with main emphasis on the physics of multi-orbital materials. I will start reminding some basic concepts of the Mott transition in single band systems, as the opening of the gap in the insulator, the renormalization of the quasi-particle weight and mass in the correlated metal or the special role played by half-filling. We will then move to the case in which there are several equivalent orbitals. At zero Hund's coupling the degeneracy increases the critical value of the interaction Uc and a Mott transition is found at commensurate fillings away from half-filling. Hund's coupling reduces the degeneracy effect and modifies the gap value. Its effect strongly depend on the filling giving rise to correlated Hund's metals. When the orbitals are not equivalent an orbital selective Mott transition can take place. I will finally discuss correlations in iron superconductors within the context of Mott physics in multi-orbital systems.