

# Pairing in inhomogeneous and mesoscopic systems: cold atoms, metallic clusters, nuclei.

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Different aspects of pairing in finite size quantum systems will be presented.

- i) Cold atoms in harmonic traps. Gap as a function of radius and temperature is discussed. It will be shown that the Local Density Approximation is not valid when approaching the critical temperature.
- ii) Superconducting metallic grains show an *increase* of the gap with *decreasing* size before superconductivity breaks down due to the Anderson criterium.
- iii) In the outer crust of neutron stars there are still isolated superfluid nuclei. Going deeper into the crust, it happens that the nuclei spill out neutrons which form a gas of superfluid itinerant neutrons. It will be shown that close to the spill out (overflow) point the gap becomes strongly quenched.