



ID de Contribution: 180

Type: Talk

## In memory of Peter Schuck: "Semiclassical approximation to pairing in the weak coupling regime: nuclei, cold atoms, and neutron stars"

*mardi 21 mars 2023 17:00 (30 minutes)*

A novel Thomas-Fermi (TF) approach to inhomogeneous superfluid Fermi-systems is presented and shown that it works well also in cases where the Local Density Approximation (LDA) breaks down. The novelty lies in the fact that the semiclassical approximation is applied to the pairing matrix elements not implying a local version of the chemical potential as with LDA. Applications will be given to the generic fact that if a fermionic superfluid in the BCS regime overflows from a narrow container into a much wider one, pairing is substantially reduced at the overflow point. Two examples pertinent to the physics of the outer crust of neutron stars and superfluid fermionic atoms in traps will be presented. The TF results will be compared to quantal and LDA ones.

[1] P. Schuck and X. Viñas, Phys. Rev. Lett. **107**, 205301 (2011).

[2] X. Viñas, P. Schuck and M. Farine, J. Phys. Conf. Ser. **321**, 012024 (2011); J. Phys. Conf. Ser. **338**, 012016 (2012).

[3] *Fifty years of Nuclear BCS: Pairing and Finite Systems*, 212, Ed. R. Broglia, World Scientific, 2013.

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**Classification de Session:** Tuesday 16:00-17:30

**Classification de thématique:** Semiclassical methods