

University of Pretoria Yearbook 2017

Many body physics 708 (PHY 708)

Qualification	Postgraduate
Faculty	Faculty of Natural and Agricultural Sciences
Module credits	15.00
Prerequisites	No prerequisites.
Contact time	6 lectures per week
Language of tuition	Module is presented in English
Academic organisation	Physics
Period of presentation	Semester 1

Module content

Second quantisation. Coherent states. Single particle behaviour. Hartree-Fock – perturbation – linearisation of operators. Quasi-particles, effective mass and applications: atom physics, electron gas, one dimensional delta function. Collective behaviour. Tamm- Dancoff approximation: linearisation. Time dependent Hartree-Fock. Random phase approximation. Applications: giant dipole resonance, screening in an electron gas, correlation energy in an electron gas, plasma oscillations, zero sound. Canonical transformation – Cooper pairs, BSC theory. Thomas-Fermi theory. Density functional theory. Superconduction. Ginzberg-Landau theory. Zero field finite temperature BCS.

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