

University of Pretoria Yearbook 2021

Many body physics 708 (PHY 708)

Qualification	Postgraduate
Faculty	Faculty of Natural and Agricultural Sciences
Module credits	15.00
NQF Level	08
Prerequisites	No prerequisites.
Contact time	6 lectures per week
Language of tuition	Module is presented in English
Department	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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