



NITheP cordially invites you to a seminar by

Professor John Hey

University of KwaZulu-Natal & University of Calgary

Date: Friday, 7th September 2018 **Time:** 11h30 -12h30

Venue: NITheP Seminar Room, 3rd Floor, H-Block

Title: On the use of the axially symmetric paraboloidal coordinate system in deriving some properties of Stark states of hydrogenic atoms and ions

Abstract: Microscopic electric fields in the plasma medium ensure that the Stark effect (both static and dynamic) influences the spectral line shapes, while, in magnetically confined fusion plasmas, an electric field also arises in the frame of a beam of rapidly moving atoms (the motional Stark effect). Of the various coordinate systems in which separation of variables in the Schrödinger equation can be achieved, only two are suitable for the description of the atomic Stark states: the parabolic and the axially symmetric paraboloidal systems. While the parabolic coordinate system has been widely applied in providing the quantum mechanical basis for the description of the Stark states, following the pioneering studies of Schrödinger and Epstein, use of the alternative axially symmetric paraboloidal coordinate system in atomic physics appears to have been confined to the so-called ‘Old Quantum Theory’ of Sommerfeld. We aim to show that the axially symmetric paraboloidal coordinate system, widely applied in electromagnetic theory, can also be used to derive the properties of the Stark states, from the standpoint of wave mechanics and operator calculus.