Electron capture by the exited hydrogen atom in the dense semiclassical 
partially ionized plasma  
E.O. Shalenov, M.M. Seisembayeva, K.N. Dzhumagulova, T.S. Ramazanov  
IETP, Department of Physics, al-Farabi KazNU, al-Farabi 71, 050040 Almaty, Kazakhstan  

The elementary processes in plasma have received considerable attention in many areas 
of physics such as astrophysics, atmospheric science, atomic physics, molecular physics, 
plasma physics, and surface sciences since the excitation and ionization of atoms and 
molecules have provided useful structural information on the collision systems as well as the 
physical information on environments of the collision systems. Especially, the electron- 
impact excitation of atoms in plasmas has been of a great interest since the emission spectra 
related to the excited atomic states would provide the useful information on plasma 
parameters, such as plasma density and temperature. Recently, the physical characteristics and 
properties of quantum plasmas have been extensively explored since the dense quantum 
plasmas are ubiquitous and have been found in nano-scale objects in modern science and 
technology, such as nano-devices, nano-wires, quantum dots, and semiconductor devices as 
well as astrophysical compact objects. One of the elementary processes in plasma is the 
electron capture process. In this work, the electron capture processes by the exited hydrogen 
atom was investigated. Here we took into account the polarization of the exited atom in 
different quantum-mechanical states. The motion of the electron in the field of the motionless 
atom was considered on the basis of the perturbation theory and the solving of the equation of 
motion. The interaction potentials between the electron and the hydrogen atom, taking into 
account the quantum-mechanical effect of diffraction and plasma screening effects, were 
presented in works [1-4]. In this work, the electron capture radius, which was determined by 
equating the kinetic energy of impacting electron and the interaction energy between the 
electron and the hydrogen atom, was presented. The trajectory of the electron in the field of 
the atom was simulated [4]. Using the electron capture probability, the electron capture cross 
section was calculated.  

References  