

Abstract

A plasma has been defined as a quasi-neutral gas of charged particles showing collective behaviour. Plasmas can support waves depending on the local conditions, the presence of external electric and magnetic fields. A characteristic property of plasmas is their ability to transfer momentum and energy via collective motion. An example in this case, is the Langmuir waves where plasma electrons oscillate against a stationary ion background. In a superconductor, two plasma electrons arise one that is made up of normal electrons and the other that is made up of super-electrons. In this study, we consider a system of super-electrons forming a super-particle. The motion of the plasma super-particles around a magnetic vortex core has been studied in the YBCO123 and Bi2212 systems. The results reveal an assemblage of super-particles that contain the magnetic flux within the vortex core of radius $r_0 \cong 1.3 (1.728 \text{ E} \times 10^{-18})^{1/2} \text{ \AA}$.