# Screening of the charged particle field in rare ionized gas.

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**Abstract.**

Shielding of the field of a micron-sized particle in an ionized gas leads to a redistribution of ions in the particle field and is analyzed for a rare gas, where a size of the region of the particle field is small compared to the mean free path of ions in a gas. A self-consistent particle field is determined by free ions and trapped ions which are captured by the particle field and move along closed trajectories. For a rare surrounding plasma, the number density of trapped ions exceeds significantly that of free ions because the resonant charge exchange event for a trapped ion transfers it mostly in other closed trajectory. As the number density of plasma electrons and ions increases, the role of trapped ions in the micron-sized particle shielding decreases, and for a dusty plasma the role of free and trapped ions in shielding of the particle field is comparable. The approximated formulas are obtained for a size of the particle field region and for the number density of free and trapped ions in this region. The particle size is independent of the particle field shielding because the particle charge follows from the equality of electron and ion fluxes to the particle surface, and these fluxes are created in the plasma region outside the action of the particle field.