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Simple explanation of stationary voids in a weakly magnetized nanodusty plasma[1] FRANKO GREINER, BENJAMIN TADSEN, NILS KÖHLER, IEAP, Christian-Albrechts-Universität, Kiel, JAN CARSTENSEN, ABB Switzerland Ltd, ALEXANDER PIEL, IEAP, Christian-Albrechts-Universität, Kiel
— Voids are an interesting feature of three dimensional dust clouds in laboratory plasmas. To create large dust clouds under normal gravitational conditions on earth, nanodust can be used. In our experiments the nanodust is produced in a rf driven, capacitively coupled, parallel plate reactor using an argon acetylene mixture at 10 - 30 Pa. It is well known, that density and potential show single humped profiles in such a configuration. In a simplified single particle picture (SPP) the void boundary establishes at a position, where the sum of ion drag force and electric field force are balanced. In contrast to unmagnetized plasmas, where the size of the void increases with increasing particle size, a weak magnetization ($B \approx 100$ mT) results in a large, stationary void. The void captures nearly the whole discharge volume and is independent of the dust size. Spatially resolved Langmuir probe measurements, due to technical reasons performed in in the pure argon plasma, show that the floating potential profile and density profile are both double humped. Consistent with experimental observation, the SPP leads to the "non-confinement" of all particles with radii smaller than a critical value.

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