Surface tension of Coulomb balls

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The plasma parameters corresponding to those of a dc discharge in neon at 77 K temperature, at self-organization of dense Coulomb balls with a dust particle number density of more than $4{\cdot}10^{11}\,\mathrm{m}^{-3}$, were calculated. Neon pressure was in the range from 20 to 160 Pa. A model for calculating an analogue of the surface tension coefficient for a Coulomb ball was proposed [1]. The values of the potential energy of the dust particle and the analogue of the surface tension coefficient of the Coulomb ball were estimated and compared with data obtained by other authors. The calculated values of the analogue of the surface tension coefficient for a Coulomb ball agree with the calculations of V. N. Tsytovich [2], and they are significantly lower than those of liquid helium. The obtained small values of the analogue of the surface tension coefficient for Coulomb balls indicate that, under the conditions of our experiments, self-organization of Coulomb balls is mainly governed by the parameters of the plasma-dust trap.

[1] Polyakov D N, Shumova V V and Vasilyak L M 2021 *Physics Letters A* **389** 127082
[2] Tsytovich V N 1997 *Phys. Usp.* **40** 53–94