



# Van der Waals-Casimir-Polder interaction of an atom with a composite surface

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We study the dispersion interaction of the van der Waals and Casimir-Polder (vdW-CP) type between a neutral atom and the surface of a metal by allowing for nonlocal electrodynamics, i.e. electron diffusion. We consider two models: (i) bulk diffusion, and (ii) diffusion in a surface charge layer. In both cases the transition to a semiconductor is continuous as a function of the conductivity, unlike the case of a local model. The relevant parameter is the electric screening length and depends on the carrier diffusion constant. We find that for distances comparable to the screening length, vdW-CP data can distinguish between bulk and surface diffusion, hence it can be a sensitive probe for surface states.

Comments: v2: expanded references, statements on current status in the field.  
10 pages, 6 figures

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