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**Investigation of electrostatic “patches” on Au samples: Effects on the Casimir measurements** RICARDO DECCA, GUILLAUME VOISIN, Department of Physics, Indiana University-Purdue University Indianapolis — It has been argued by Behunin and co-workers that the measurements done of the Casimir force on Au coated surfaces could suffer from substantial systematic errors arising from the presence of so called electrostatic “patches” (i.e. an electrostatic potential distribution on the surface of the Au layer). While these effects can be minimized, in principle they cannot be nullified by the application of uniform potential differences between the investigated surfaces. We present Kelvin probe microscopy studies of Au samples on Si. Au samples (about 200 nm thick) were deposited by thermal evaporation and sputtering. A thin (about 10 nm thick) layer of Cr is used as an adhesion layer. We will discuss the methodology used. We will show that that irrespectively of sample deposition method, there is two characteristic scales for the potential distribution: One, with spatial size of about 100 nm, associated with grain sizes and the other one, typical dimension 1  $\mu\text{m}$ , most likely associated with unavoidable sample contamination. The effect of this potentials is found to be too small to affect the conclusions found in precision measurements of the Casimir effect.

Ricardo Decca  
Indiana University-Purdue University Indianapolis

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