Abstract Submitted
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**Analytical modelling of symmetry breaking in extraordinary optoconductance**[1] K.A. WIELAND, S.A. SOLIN, Washington university in St. Louis — The EOC effect[2] is due to the differential mobilities of the photogenerated electrons and holes. EOC devices with symmetric leads have a antisymmetric positional dependence which, when the device is uniformly illuminated, leads to a minimization of the output voltage. Using a previously employed point charge model, we address two ways to break the symmetry and recover the output signal. The first is to impose uniform illumination on half the sample. This method has practical limitations as the device is miniaturized to the nanoscale. The second is asymmetric placement of the voltage probes. The crucial effect of the surface charge density is modeled in two ways - with constant charge density and by fitting experimental data. Utilizing this approach, optimal lead positions are found. For a 10mm by 2mm thin sample of GaAs with a Au shunt, the EOC reaches a calculated maximum of $\sim$ 600% for lead positions $x_1$= 5 mm and $x_2$ $\sim$5 mm using the fit surface charge density model. However, the voltage lead positions for maximum EOC were found to not correlate with the voltage lead positions for maximum output voltage, making EOC a poor indicator of the suitability of the device as a nanosacale sensor.

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[2]K. Wieland et al., Appl. Phys. Lett., 88 (2006) 52105

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