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Shunt-Enhanced, Lead-Driven Bifurcation of Epilayer GaAs based EEC Sensor Responsivity STUART SOLIN[1], FLETCHER WERNER[2], Washington Univ — The results reported here explore the geometric optimization of room-temperature EEC sensor [1] responsivity to applied bias by exploring contact geometry and location. The EEC sensor structure resembles that of a MESFET, but the measurement technique and operation distinguish the EEC sensor significantly; the EEC sensor employs a four-point resistance measurement as opposed to a two-point source-drain measurement and is operated under both forward and reverse bias. Under direct forward bias, the sensor distinguishes itself from a traditional FET by allowing current to be injected from the gate, referred to as a shunt, into the active layer. We show that the observed bifurcation in EEC sensor response to direct reverse bias depends critically on measurement lead location. A dramatic enhancement in responsivity is achieved via a modification of the shunt geometry. A maximum percent change of 130,856% of the four-point resistance was achieved under a direct reverse bias of -1V using an enhanced shunt design, a 325 fold increase over the conventional EEC square shunt design. This result was accompanied by an observed bifurcation in sensor response, driven by a rotation of the four-point measurement leads.

[1] A.K.M. Newaz, et al, Phys Rev B. 79, 195308 (2009).

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