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Spin-Orbit Interaction in High-κ Dielectric Gated Rashba-2D Electron Gas and Mesoscopic Rings YANHUA DAI, ZHUOQUAN YUAN, KRISTJAN STONE, RUI-RUI DU, Physics and Astronomy, Rice University, MIN XU, PEIDE YE, Electrical and Computer Engineering, Purdue University — There is increasing current interest in the quantum interference effect in mesoscopic devices fabricated on a Rashba-2D electron gas (2DEG), where the spin-orbit interaction parameters can be tuned by a potential gate. We explore ring structures that use a gate consisting of thin (5nm-50nm) high-κ dielectric Al_2O_3 or HfO_2 layer and nano-patterned metals. The 2DEG is provided by lattice-matched $In_{0.52}Al_{0.48}As/In_{0.53}Ga_{0.47}As/In_{0.52}Al_{0.48}As$ quantum wells that have a typical electron density n of $1.5 \times 10^{12}/cm^2$ and mobility $\mu \geq 2 \times 10^4 cm^2/Vs$. The dielectric material was grown by atomic layer deposition. We will present the gate characteristics of Hall bars as well as magnetic transport data from gated mesoscopic rings. The work at Rice is funded by NSF DMR-0706634. Reference: M. Konig et al, Phys. Rev. Lett. 96, 076804 (2006); T. Bergsten et al, Phys. Rev. Lett. 97, 196803 (2006); B. Grbic et al, Phys. Rev. Lett. 99, 176803 (2007).

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