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Temperature-dependent spin- and phase coherence measured via h/e and h/2e quantum oscillations in resistance of mesoscopic ring arrays in an InAs 2DES R.B. LILLIANFELD, R.L. KALLAHER, J.J. HEREMANS, Virginia Tech, W. VAN ROY, G. BORGHS, IMEC- Belgium — We investigate electron spin- and phase coherence in an array of quasi-ballistic InAs quantum well mesoscopic rings through observation of Aharonov-Bohm h/e oscillations (AB) and Altshuler-Aronov-Spivak h/2e oscillations (AAS). The temperature dependence of the AAS oscillations is characterized through a single effective coherence length, $L_{\rm eff}$, following the formalism of Douçot and Rammal, from which the phase coherence length, L_ϕ and the spin coherence length as limited by spin-orbit interaction, $L_{\rm SO}$, are extracted. AB oscillations are also present, and can be separated from AAS by Fourier transformation. We contrast the AAS method of extracting the coherence lengths with analysis of the AB oscillation amplitudes. Previous studies have examined L_ϕ from AB signals in single ballistic rings, or by using AAS amplitudes in large networks, or have observed AB and AAS in single rings with spin-orbit interaction. Here the presence of both AB and AAS in an array with spin-orbit interaction allows for study of both L_ϕ and $L_{\rm SO}$, and enables direct juxtaposition of different quantum coherence phenomena as means for measuring coherence lengths (DOE DE-FG02-08ER46532).

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