

# **Single-particle and collective spin excitations in semi-magnetic quantum wells**

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Modulation doped semi-magnetic quantum wells offer a completely new situation for the study of spin excitations in two-dimensional electron gases. Due to the small g-factors in non-magnetic semiconductors, spin polarized electron gases have been almost uniquely studied in the conditions of large orbital quantization associated to quantum Hall Effect. We will show that giant Zeeman splittings in modulation-doped CdMnTe/CdMgTe quantum wells give access under small applied magnetic fields to spin-polarized electron gases without orbital quantization. Resonant Raman scattering provides the in-plane dispersion of spin-conserving and spin-flip excitations as a function of the polarization rate and points out the emergence of new collective excitations in the electron gas. We will analyze the measured dispersions and discuss the available theories for spin excitations in two-dimensional electron gases, emphasizing the need for a critical evaluation of recently published theories of this unique many-body system.