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Electrostatic control of spin polarization in a quantum Hall ferromagnet: a new platform to realize non-Abelian excitations ALEXANDER KAZAKOV, Purdue University, V. KOLKOVSKY, Z. ADAMUS, G. KARCZEWSKI, T. WOJTOWICZ, Institute of Physics, Polish Academy of Sciences, LEONID ROKHINSON, Purdue University — Several experiments detected signatures of Majorana fermions in nanowires, and the focus of current research is shifting toward systems where non-Abelian statistics of excitations can be demonstrated. To achieve this goal we are developing a new platform where non-Abelian excitations can be created and manipulated in a two-dimensional plane, with support for Majorana and higher order non-Abelian excitations. The system is based on CdTe quantum wells non-uniformly doped with paramagnetic impurities, which result in a complicate field-dependence of Zeeman splitting. A unique property of the system is that at high fields we can form a quantum Hall ferromagnet with gate-controllable spin polarization. Helical 1D edge channels formed along the edges of electrostatic gates may support generalized non-Abelian excitations in the fractional qunatum Hall regime, and Majorana and parafermion excitations in the presence of induced superconductivity. We will present results on the gate control of s-d exchange in specially designed heterostructures, demonstrate gate control of spin polarization at filling factor $\nu = 2$, and show spatial separation of quantum Hall states with different spin polarization using lithographically defined gates.

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