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Spintronics without magnets: spin-optics. MAXIM KHODAS, Weizmann Institute of Science, Rehovot, Israel, ARCADI SHEKHTER, Weizmann Institute of Science, Rehovot, Israel, ALEXANDER FINKEL'STEIN, Weizmann Institute of Science, Rehovot, Israel — We describe how to spin-polarize electrons in a two-dimensional semiconductor heterostructure with a field-effect gate control of the spin-orbit interaction. In the suggested scheme, a beam of electrons splits in two spin-polarized components propagating at different angles. The phenomenon is similar to the birefringence of light in crystal optics. We outline possible devices based on the spin-dependent refraction of the current carriers, including spin filter and spin switch. The proposed program aims to solve the goals of spintronics by using only nonmagnetic semiconductors.

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