

Spintronics with semiconductors

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Abstract

While today's semiconductor electronics is based on the manipulation of electron charge, "spintronics" uses spin for extended functionality. Semiconductor spintronics is still in its infancy, in contrast to metallic magnetoelectronics, which e.g. is present in all modern reader heads of computer hard disks. I will discuss a novel spin laser, whose principle concept was recently demonstrated in our group, to exemplify challenges of semiconductor spintronics. The laser threshold of a vertical cavity emitting laser (VCSEL) is effectively reduced by pumping with spin-oriented electrons which suppress competitive dynamics of laser light with opposite circular polarization. I will present a variety of approaches to injecting spin into semiconductors and report latest results on semiconductor structures with long lasting spin memory - prerequisites for the realization of an electrically pumped spin laser at room temperature.