In this lecture we will introduce the field of spintronics which has revolutionized magnetic storage technologies, is making its way into semiconductor microchips, and represents one of the most rapidly developing scientific fields in nano-electronics. We will start by introducing basic concepts of spintronics which recognize that, apart from the electrical charge, each electron carries a microscopic magnetic moment called spin. Its utility led to discoveries of many new physical effects in magneto-electronics, some of which are now widely used in applications and others still challenging our basic understanding of relativistic quantum-mechanics phenomena. Current spintronics research topics pursued both in the Academy of Sciences of the Czech Republic and worldwide will be the main topic of the lecture. We will also discuss the prospect of spintronics in terms of its future applications in information technologies.

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