

PHYSICS DEPARTMENT COLLOQUIUM

“SPINTRONICS: SELECTED PROBLEMS”

BY

DR. EMMANUEL RASHBA

Emerging field of spintronics develops as unification of the semiconductor and superconductor electronics, photonics, and magnetism. It includes fundamental problems of solid state physics and promising applications. Essential inclusion of the spin degree of freedom into the transport phenomena and drawing together processing and storing information belong to the basic paradigms of this field. Applications based on the effect of the giant magnetoresistance in metallic layered systems and of the tunnel magnetoresistance developed without considerable theoretical efforts and are already absorbed by the industry. Just opposite, quantum computing still exists only in a remote perspective and will need investing tremendous experimental and theoretical efforts.

Creating of spin transistor seems realistic at a reasonable time scale and is considered as a promising and challenging device. It is based on two concepts: (i) spin injection and (ii) spin orbit coupling in semiconductor microstructures. I will speak mainly on these two problems.

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