Multiferroic $Ge_{1-x}Mn_xTe$ – Unique Material for Spintronics

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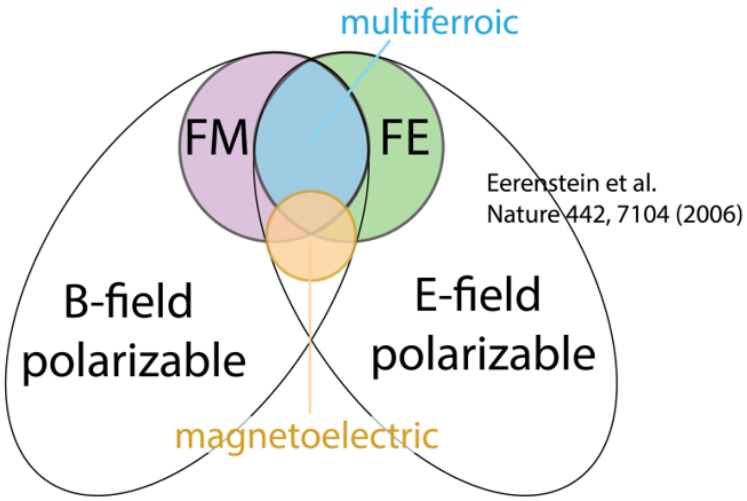
This research project focuses on **$Ge_{1-x}Mn_xTe$**, a cutting-edge material that combines ferromagnetism and ferroelectricity within one system. This rare combination makes it a promising candidate for future **spintronic devices**, which aim to use electron spins—rather than just charge—for data processing and storage. What sets GeMnTe apart is the presence of the **Rashba effect**, a quantum phenomenon that leads to spin-split energy bands. When combined with magnetic ordering, it enables the material's magnetic state to be influenced by electric fields, offering potential for ultra-fast, low-power magnetic control [1].

As a student researcher, you will work in the **Magneto-optical lab (MOL)**, providing you a system designed to probe the magnetic properties of materials using polarized light [2]. Your task will be to perform **optical** measurements on GeMnTe thin films while varying the temperature in order to investigate the phase transition from ferrimagnetic to spin glass. These experiments aim to reveal how the material's magnetization evolves with changing temperature and external magnetic fields, providing us with critical insights into magnetic behavior and potential multiferroic properties. This project provides hands-on experience with advanced optical techniques and is ideal for students interested in condensed matter physics, magnetism, or optical spectroscopy.



[1] Krempaský, et al. *Nature Communications* 14.1, 6127 (2023).

[2] Wohlrath, et al. "*Journal of Physics D: Applied Physics* 58.15, 155001(2025).