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Spin transport across oxide semiconductors and antiferromagnetic oxide interfaces

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Propositions

accompanying the thesis

Spin transport across oxide semiconductors and antiferromagnetic oxide interfaces

1. The interface between correlated oxides (complex oxides) exhibits tunable electronic properties and offers new perspectives for the electric field control of novel spin transport phenomena in spintronics (Chapters 3-4).
2. The modulation of the electric field across the Schottky interface of Nb-doped SrTiO₃ (Nb:STO) requires a deeper understanding of semiconductor spintronics and useful for applications in memristive devices.
3. The occurrence of large Tunneling Anisotropic Magnetoresistance (TAMR) across the Co-SrTiO₃ interface is still an open question.
4. Despite limitations, three-terminal (3T) spin injection-detection is still an essential transport geometry to extract spin-dependent responses across semiconducting interfaces (Chapters 3-4).
5. The flexibility in magnetic ordering and exchange in thin-film manganites provide a new route for antiferromagnetic spintronics and magnonics (Chapter 5).
6. The ferroelectricity in SrMnO₃ induced by epitaxial strain can be an important consideration for electric field control of magnon transport and electrical transport of topological magnetic textures across SrMnO₃ / SrRuO₃ interfaces.
7. It is very difficult to have a unified theory of spin transport, owing to the plethora of intricacies that different materials and device geometries offer.
8. A research group needs to conduct regular journal club that inspires new ideas, throws new experimental challenges, and embraces timely physics concepts.
9. The “precise”-ness in communicating research ideas and results is essential for progressing one’s research.
10. The pandemic (COVID 19, year 2020) solidified the relevance of interdisciplinary science to society. It also aided governmental policies.
11. The onus is on the (experimental) researcher to present their data clearly after thorough and reproducible studies or else the scientific competition becomes unhealthy.
12. *“We want that education by which character is formed, the strength of mind is increased, the intellect is expanded, and by which one can stand on one’s own feet.”* Swami Vivekananda