

NATIONAL INSTITUTE OF SCIENCE EDUCATION  
AND RESEARCH

SIXTH SEMESTER PROJECT REPORT

---

**On Spin Hall Effect**

---

*Author:*  
Ashish PANIGRAHI

*Supervisor:*  
Dr. Kartik SENAPATI

*A report submitted in fulfillment of the requirements  
for the course of P398*

*in the*

Superconducting Spintronics Lab  
School of Physical Sciences

May 27, 2021

*"Thanks to my solid academic training, today I can write hundreds of words on virtually any topic without possessing a shred of information, which is how I got a good job in journalism."*

Dave Barry

NATIONAL INSTITUTE OF SCIENCE EDUCATION AND RESEARCH

# *Abstract*

Dr. Kartik Senapati  
School of Physical Sciences

P398

**On Spin Hall Effect**  
by Ashish PANIGRAHI

The Thesis Abstract is written here (and usually kept to just this page). The page is kept centered vertically so can expand into the blank space above the title too...

## *Acknowledgements*

The acknowledgments and the people to thank go here, don't forget to include your project advisor...

## Chapter 1

# Introduction

### 1.1

## Chapter 2

# The Hall Effects

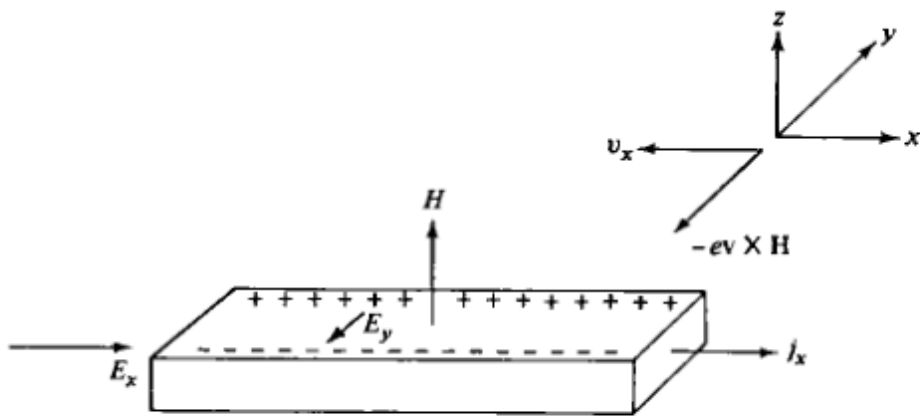
### 2.1 Introduction

These effects originally deal with the application of an external magnetic field on a current carrying material and subsequently observing the effect either on the conductor or the electric current itself.

In 1879, Edwin Hall was exploring this interaction and tried to determine the effect of the magnetic field on a current carrying wire, with a suspicion that it either affected the whole length of the wire or only the moving electrons.

He later devised a rather simple experiment based on the argument that “if the current of electricity in a fixed conductor is itself attracted by a magnet, the current should be drawn to one side of the wire, and therefore the resistance experienced should be increased.” (S., 1880, p. 1)

He couldn’t detect this extra resistance (which we now know as magnetoresistance) but concluded that a transverse force in the opposite direction must exist and which appears as a transverse voltage across the width of the conducting material. This is the Hall effect and the transverse voltage is the Hall voltage.



**Figure 1.3**  
Schematic view of Hall's experiment.

FIGURE 2.1: Schematic diagram of the Hall effect

# Bibliography

S., A. (1880). "On a new Action of the Magnet on Electric Currents<sup>1</sup>". In: *Nature* 21.537, pp. 361–361. ISSN: 1476-4687. DOI: [10 . 1038 / 021361a0](https://doi.org/10.1038/021361a0). URL: [https : / / doi . org / 10 . 1038 / 021361a0](https://doi.org/10.1038/021361a0).