

# Master-Thesis

## Determination of Liquid Permittivity Using Advanced Measurement Techniques for THz Sensing Applications

Permittivity, also known as the dielectric constant, is a fundamental property of materials that affects how they interact with electric fields. In liquids, permittivity plays a crucial role in various applications ranging from material science and chemistry to electrical engineering and medical diagnostics. Accurate determination of the permittivity of liquids is essential for the development of advanced materials, the design of electronic devices, and the improvement of diagnostic techniques. Techniques such as impedance spectroscopy rely on permittivity measurements for characterizing biological tissues and fluids.

### Objectives

The primary objective of this research is to develop a robust methodology for accurately determining the permittivity of various liquids. The specific objectives are:

1. To review and compare existing methods for measuring liquid permittivity.
2. To design and implement an experimental setup for permittivity measurement.
3. To validate the experimental setup using standard liquids with known permittivity values.
4. To apply the developed methodology to measure the permittivity of a range of liquids, including polar and non-polar substances.
5. To analyze the effect of temperature and frequency on the permittivity of selected liquids.

### Requirements:

- Experience with optical system measurements
- Knowledge of python
- Good english speaking skills

**After completing the work, there are good career prospects in the following areas:**

- THz sensing
- Biomedical applications

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