TU Dresden

Advanced practical course

Lab report

Nuclear Magnetic Resonace

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1 Introduction

1.1 Motivation

Nuclear Magnetic Resonance is a physical phenomenon that can be observed while placing an ensemble of nuclei into a static magnetic field and stimulate it with a high-frequent alterning field. A necessary condition for this effect is that the atoms of the sample have a *nuclear spin* different from zero. It is the central concept that is used for *NMR-Spectroscopy*, a standard methodology for the investigation of the structure and interaction of complex molecules and solid state bodies by measuring local magnetic fields, and the *magnetic resonance tomography* which is an imaging technique used in clinical diagnistics for describing the morphilogic and physiologic build-up of tissues and organs. For all of those applications we need to find out some central parameters of particular physical compensation-processes, the so called *relaxation times* T_1 and T_2. In the following experiment exactly those material-characteristic obserables are determined for an ensemble of ^{57}Fe-nuclei. But at first some basic knowledge.

1.2 Nuclear Zeeman-Effect

2 Experimental procedure

2.1 Preparation of a high frequency resonant circuit

First one has to prepare a copper coil with a diameter big enough to hold an iron powder assay. After the coil is wrapped one has to sold it onto the contacts of a stick, which provides a mechanism to tune the measured frequency to find the resonance frequency. One has to be carefully

2.2

2.3

3 Data Analysis

4 Discussion and conclusions

References

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