

XIII. MAGNETIC RESONANCE*

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RESEARCH OBJECTIVES

1. Nuclear Spin Interactions in Solids

We are investigating a variety of rather elaborate transient NMR experiments whose general aim is to add to the information obtainable about spin interactions in solids. For example, we have shown that by applying RF and DC magnetic fields of appropriate intensities, directions, and time sequences it is possible to measure: (a) a modified fourth moment for dipolar interactions, (b) a modified sixth moment for dipolar interactions, and (c) small chemical shifts in the presence of large dipolar interactions.

2. Nuclear Relaxation and Inelastic Scattering in Gases

We have completed a study of nuclear relaxation in H_2 -He mixtures and related it to the anisotropic H_2 -He intermolecular potential by means of quantum-scattering calculations. Similar work is now being carried on in HCl-He, ^{13}CO -He, and other systems.

3. Kerr Effect in Nonideal Gases

We are setting up an apparatus for accurate measurement of the Kerr electro-optical effect and equation of state in gases. The nonidealities displayed in these experiments are related to the intermolecular potential, and are expected to give new information about its anisotropic part. The first experiments are being conducted in HCl.

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