

sus their spin-spin coupling in the other dimension. The general method can be extended, almost without foreseeable limits. The single pulses used in this simple example can be elaborated to produce and to selectively read out many forms of coherence or other phenomena such as through-space Overhauser effects. These include coherences that are highly forbidden to direct magnetic detection, such as those between states that differ by more than a single spin flip. Not only are these methods interesting; they are also extremely useful for determining, for example, structure and dynamics of macromolecules.

Richard Ernst and his coworkers have undoubtedly developed a larger variety of two-dimensional nmr methods than anyone else, and they have also been in the forefront of theoretical analysis. Therefore it is a pleasure to welcome this treatise, which covers the theory of these methods in a unified way. The book is primarily concerned with nmr of molecules in solution. This subject lends itself to a unified theoretical approach because such molecules contain finite spin systems, which interact only weakly and for which a single kind of external operation—a short rf pulse—can be used, alone or in combination, to produce all the results described in this book.

Much of the discussion is couched in superoperator formalism, which is necessary for a unified treatment. The book is not written for the casual reader. It starts from elementary spin and statistical theory and carries the reader through the theory to the most sophisticated experiments in a way not hard to follow once the reader abandons trying to read the book through from beginning to end and instead pursues the many internal cross-references. These cross-references, and the literature references as well, are both frequent and excellent.

This is not really a comprehensive textbook of nmr theory or experimental technique, although it does treat a large number of topics outside its main subject of two-dimensional nmr in solution. Many of these, such as nmr in solids, have already been well covered in other treatises and are discussed rather briefly here. The book also does not impart much feeling for experimental strategy; the methods are all here, but you will have to look at the current literature to learn which ones are really used in practice. A beginner would want to read this text in conjunction with other, more experimentally oriented ones on nmr as applied to physics and

chemistry, or would want to ask for guidance from an nmr specialist.

Spectroscopists in other high-resolution fields of physics may find some useful ideas here. The book is also worthwhile reading for anyone interested in applications of superoperator theory. It joins the treatises of Anatole Abragam (*Principles of Nuclear Magnetism*; Oxford U. P., New York, 1961) and Charles Slichter (*Principles of Magnetic Resonance*; Springer-Verlag, New York, 1961; third edition in press) as an indispensable classic in nuclear magnetic resonance.

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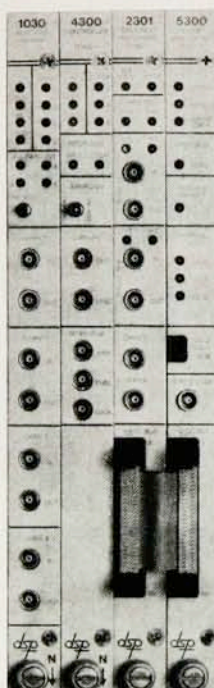
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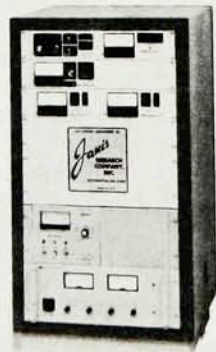
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