



Translational Dynamics and Magnetic Resonance: Principles of Pulsed Gradient Spin Echo NMR

By Paul T. Callaghan

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Taking the reader through the underlying principles of molecular translational dynamics, *Translational Dynamics and Magnetic Resonance* outlines the ways in which magnetic resonance, through the use of magnetic field gradients, can reveal those dynamics. The measurement of diffusion and flow, over different length and time scales, provides unique insight regarding fluid interactions with porous materials, as well as molecular organization in soft matter and complex fluids.

The book covers both time and frequency domain methodologies, as well as advances in scattering and diffraction methods, multidimensional exchange and correlation experiments and orientational correlation methods ideal for studying anisotropic environments. At the heart of these new methods resides the ubiquitous spin echo, a phenomenon whose discovery underpins nearly every major development in magnetic resonance methodology. Measuring molecular translational motion does not require high spectral resolution and so finds application in new NMR technologies concerned with 'outside the laboratory' applications, in geophysics and petroleum physics, in horticulture, in food technology, in security screening and in environmental monitoring.

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Editorial Review

Review

"This book is most likely going to become 'the' book for NMR-based studies of translational dynamics for quite some time: a great reference point not just for NMR in translational dynamics but for everyone interested in NMR applications beyond mere chemical structure determination." -- **Nikolaus Nestle, Technical University, Darmstadt, Germany**

About the Author

Paul Callaghan is a world leader in the use of magnetic field gradients to measure molecular translational motion, having led most of the major advances for the past 30 years. He was made Professor of Physics in 1984, and was appointed Alan MacDiarmid Professor of Physical Sciences in 2001. The sole-authored and co-authored output of Callaghan and his co-workers is represented by some 250 scientific papers and 3 patents, and by a definitive research monograph. This work has been recognized by a Fellowship of the Royal Society of New Zealand (1991), The Royal Society of London (2001), the (European) Ampere Prize (2004), The (NZ) Cooper (1991), Mechaelis (1994), Hector (1998), and Rutherford Medals (2006), and by Callaghan's election as President of the International Society of Magnetic Resonance (2008), appointment as Associate Editor of the *Journal of Magnetic Resonance* (2009), and award of the Gunther Laukien Prize for Magnetic Resonance (2010).

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