



北大-清华-物理所 “量子物质科学协同创新中心”

Beijing Center for Quantum Matter

Probing Materials Using Radioactive Local Probes: An Introduction to the μ SR and β NMR Techniques

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Time: 4:00pm, May. 8, 2013 (Wednesday)

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Venue: Conference Room 607, Science Building 5

地点: 理科五号楼607会议室

Abstract

The Centre for Molecular and Materials Science (CMMS) at TRIUMF provides intense beams of spin-polarized muons and radioactive ions for Canadian and international researchers to probe materials at the molecular level. Material properties are determined using a series of magnetic resonance techniques known as μ SR (muon spin rotation, relaxation and resonance) and β NMR (beta-detected nuclear magnetic resonance) that exploit the parity violating decay of the probes. I will review the μ SR technique and give examples of how it can be used to obtain unique information about a wide range of phenomena in physics and chemistry, such as magnetic ordering and spin dynamics, internal field distributions in superconductors and the behaviour of free radicals in bulk materials. I will introduce the β NMR technique and show that it provides a window into magnetism, superconductivity and polymer dynamics near surfaces, at buried interfaces and in thin films.

The CMMS facility is in the middle of a large expansion. One new μ SR beam line with two end stations and the capability of performing high frequency and long time range measurements is being commissioned and a second new μ SR beam line is nearing completion. We are also expecting a three-fold increase in the time available for β NMR experiments due to the construction of the Advanced Rare Isotope Laboratory (ARIEL). We are actively seeking new experiments to make use of our world-leading facilities.

About the Speaker

Dr. Iain McKenzie was born in Ottawa, Canada in 1976 and received his Ph.D. in 2004 from Simon Fraser University in Vancouver, Canada where he studied isotope effects on the dynamics of free radicals using μ SR. He was a post-doctoral researcher at the University of Stuttgart, Germany from 2004 to 2006 where he used muoniated radicals as probes in soft matter systems and studied chemical reactions in zeolites. From 2006 to 2011 he was a facility scientist at the ISIS Pulsed Neutron and Muon Facility in the U.K. where he was involved in the development of the HiFi spectrometer and conducted research on muoniated spin probes in liquid crystals. Since 2011 he has been a facility scientist at the TRIUMF Centre for Molecular and Materials Science and a Research Associate at the Department of Chemistry at Simon Fraser University. His research is focused on using μ SR and β NMR to probe the microscopic dynamics of soft matter systems, particularly polymers and liquid crystals.