

# SCIENCE SEMINAR

FRIDAY, SEPTEMBER 11

KNOTT HALL B01

3PM

## FROM BIG BRAINS TO MICROSCOPIC MOLECULES: TAKING PICTURES WITH NUCLEAR MAGNETISM

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POST-DOC AT MOLECULAR BIOPHYSICS DEPT AT JOHNS HOPKINS

MAGNETIC RESONANCE IMAGING (MRI) IS USED BY RADIOLOGISTS TO NON-INVASIVELY CREATE IMAGES OF THE BRAIN AND OTHER PARTS OF THE HUMAN BODY. MRI IS A COMMONLY KNOWN TECHNOLOGY DUE TO ITS GREAT CONTRIBUTIONS TO HUMAN HEALTH. NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY (NMR) THOUGH LESS UBIQUITOUS IN POPULAR SOCIETY, IS AN EQUALLY POWERFUL TECHNOLOGY AND HAS MADE TREMENDOUS CONTRIBUTIONS TO SCIENCE AND MEDICINE. NMR IS USED BY BASIC SCIENTISTS TO DETERMINE MOLECULAR STRUCTURES AND INTERACTIONS, LEADING TO INSIGHTS ON HOW NATURE WORKS ON THE MICROSCOPIC LEVEL. THESE TWO TECHNOLOGIES, MRI AND NMR, FUNCTION IN SEPARATE CAPACITIES, YET ARE BASED ON THE SAME SCIENTIFIC PRINCIPLES. BOTH MRI AND NMR CREATE AND DETECT SIGNAL FROM THE MAGNETIC MOMENTS OF NUCLEI. THE NUCLEAR MAGNETIC SIGNALS ARE THEN USED TO DETERMINE THE CHEMICAL AND PHYSIOLOGICAL ENVIRONMENT THOSE NUCLEI ARE IN, THUS ALLOWING US TO SEE MOLECULES AND IMAGE THE BRAIN. FROM THOSE WHO USE MAGNETIC RESONANCE TO THOSE WHO DEVELOP THE TECHNOLOGY, THE FIELD SPANS RADIOLOGY, BIOLOGY, CHEMISTRY, PHYSICS, BIOMEDICAL ENGINEERING, ELECTRICAL ENGINEERING, SIGNAL PROCESSING, COMPUTER SCIENCE, AND MORE. HERE I WILL USE A SEMI-CLASSICAL (SEMI-QUANTUM!) EXPLANATION OF THE SCIENCE BEHIND THESE TWO AMAZING TECHNOLOGIES AND DISCUSS ACTIVE AREAS OF RESEARCH IN THESE FIELDS.

REFRESHMENTS WILL BE SERVED