

# THE DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING SPEAKER SERIES

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Center for Integrated Bio and Nano Systems

**PRESENTS**

## Selected Applications of MRI in Petrophysics



### **Dr. Stefan Hertel**

Researcher at Rock and Fluid Physics Group at Shell Intl. E&P Inc.  
Houston, TX

**Friday, November 17**

**11:15 a.m. (Refreshments served at 12:15 pm)**

**ROOM: CBB 104**

### **LECTURE ABSTRACT**

Magnetic Resonance Imaging (MRI) can be invaluable for characterizing rock samples taken from oil-bearing reservoirs because it is non-invasive and requires minimal sample handling. It is routinely used in specialized laboratories to measure porosity and fluid saturations of core plugs to reduce the uncertainty of downhole measurements. MRI is based on Nuclear Magnetic Resonance (NMR), which is measuring the nuclear spins of hydrogen contained in the fluids of a sample. This underlying principle is the same as for MRI in the healthcare industry. Thus, there is a rich history of exchange regarding MRI between the health sciences and the hydrocarbon industry. However, the interaction of the spin bearing molecules with a rock matrix is different from that of tissue, and specialized techniques need to be devised. In this talk, I will present some of the methods which we frequently use in our lab, such as T2 relaxation time measurements, imaging and relaxation time mapping. More recently, we adopted fast imaging techniques with Compressed Sensing to measure fluid dynamics during core floods. These novel tools allow us to track fluid fronts with a time resolution of a few minutes, which may help to calibrate computational fluid flow models. Such computational models are increasingly used to screen scenarios in the oil field and to speed up decision making.

### **SPEAKER BIOSKETCH**

Stefan Hertel is a researcher in the Rock and Fluid Physics group at Shell Intl. E&P Inc. in Houston, TX. He joined Shell in 2015 after graduating with a Ph.D. in physics from Victoria University of Wellington, New Zealand. His past research projects revolved around measuring diffusion of molecules in catalyst particles with the help of Nuclear Magnetic Resonance (NMR) and the enhancement of resolution in Magnetic Resonance Imaging (MRI). In his current role, his research focuses on fast acquisition schemes with MRI and the spin physics of NMR applied to hydrocarbon reservoir rocks.

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**Contact Prof. Stanko R. Brankovic (SRBrankovic@uh.edu) if you would like to arrange for a time to meet with Dr. Hertel.**

**UNIVERSITY of HOUSTON**

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