



# ECE Distinguished Lecture Series



## David Jiles

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### Deep Brain Stimulation using Magnetic Fields for Non-invasive Therapy of Brain Disorders

Time: Wednesday, March 22, 2017, 1:00 pm – 2:00 pm

Location: SEH B1220

#### Abstract

This lecture will describe Transcranial magnetic stimulation (TMS) – a method of stimulating regions of the brain using magnetic fields – which is developing rapidly for both diagnostic and therapeutic purposes including treating brain damage from strokes, aging and head trauma. So also is the demand for improved performance in stimulation, particularly in terms of the ability to stimulate deeper lying regions of the brain and to do so selectively. The magnetic coil designs that are used presently are limited in their ability to stimulate the brain at depth and with high spatial focality. Consequently any improvement in coil performance would have a significant impact in extending the usefulness of TMS in both clinical applications and academic research studies. New and improved coil designs have then been developed, modeled and tested as a result of this work. A large magnetizing coil, the “Halo coil”, 300mm in diameter and compatible with a commercial TMS system has been constructed to determine its feasibility for use as a deep brain stimulator. The results of this work have suggested directions that could be pursued in order to further improve the coil designs. Two other novel coil designs the triple Halo coil (“THC”) and the quadruple Butterfly coil (“QBC”) have been designed and tested.

#### Biography

David Jiles earned a DSc in Physics from the University of Birmingham, a PhD in Applied Physics from the University of Hull, an MSc in Nuclear Physics from the University of Birmingham, and a BSc in Physics and Mathematics from the University of Exeter.

His research interests include biomedical applications of magnetic fields, nonlinear and hysteretic behavior of magnetic materials; applications of magnetic measurements to nondestructive evaluation.

He was the first holder of the Palmer Endowed Department Chair in Electrical and Computer Engineering at Iowa State University. He is also Anson Marston Distinguished Professor of Engineering. Immediately prior to that, he was the Director of the Wolfson Centre for Magnetics and Professor of Magnetics at Cardiff University in the United Kingdom.

He holds rank of Senior Scientist in the Ames Laboratory of the US Department of Energy, is an Honorary Professor at Cardiff University School of Engineering, and is a Visiting Professor at Sheffield University Department of Materials Science and Engineering. He has authored more than 700 scientific papers, has published three books, and holds 19 patents. He served as editor-in-chief of IEEE Transactions on Magnetics from 2005-2011.

He is a Fellow of the Royal Academy of Engineering, and the American Physical Society, the Institute of Electrical and Electronics Engineers, the Magnetics Society, the Institution of Electrical Engineers, the Institute of Physics, the Institute of Materials, and the Institute of Mathematics and its Applications and the Learned Society of Wales and the Indian Society for Nondestructive Testing.