A Dielectric Rod Antenna for Stimulating Neurological Tissue

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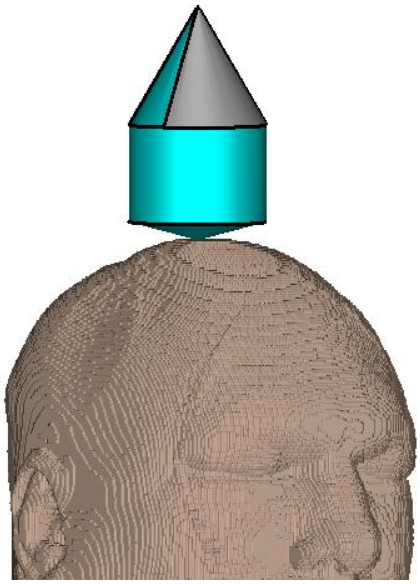
When: 9:00 AM, Tuesday, Feb. 9, 2016

Where: 1st floor conference room, IRP II

Abstract:

A dielectrically loaded wideband rod antenna has been studied as a noninvasive pulse delivery system to subcutaneous tissues. Simulation results applying 100 ps electrical pulse show that it allows us to generate critical electric fields for biological effects, such as brain stimulation, in the range of several centimeters. In order to reach the critical electric field for biological effects in the brain, the input voltage needs to be 175 kV. The electric field spot size in the brain at this position is approximately 1 cm2. To stimulate the antenna, we will present the design and implementation of an ultra-fast charge time dual resonance pulse transformer which employs a linearly integrated primary. The combination antenna and transformer set the foundation for high voltage biological experiments of the complete system. We will conclude with our current work showing the designs of a system to deliver subnanosecond pulses in vitro utilizing the dielectric rod antenna.



Biosketch:

Ross A. Petrella received his B.S in Biomedical Engineering from Virginia Commonwealth University, Richmond, VA in 2014. He is currently a Ph.D student in Biomedical Engineering at Old Dominion University in Norfolk, Va. There he is advised by Shu Xiao at the Frank Reidy Research Center for Bioelectrics. His research interests include electromagnetic effects on cells and the design of systems to deliver electromagnetic energy to biological targets.