PIONEERS IN BIOMEDICAL RESEARCH SEMINAR

Presented by the Fralin Biomedical Research Institute at VTC and co-sponsored by the institute's Center for Human Neuroscience Research

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Multi-channel MEG Measurements with a Wearable OPM System

Conventional MEG systems employ superconducting sensors housed inside a liquid helium dewar. Systems are large, expensive, and the cryocooled sensors are fixed in position. Consequently, subjects must remain still during measurements to avoid loss of data quality, limiting utility in some subject cohorts, particularly children and adults with movement disorders. Dr. Boto and her team have developed a wearable MEG system using QuSpin optically-pumped magnetometers (OPMs) which can be mounted on the scalp and if background fields are appropriately nulled, MEG data can be acquired even when individuals make natural head motions. This system provides a more comfortable experience than in traditional neuroimaging systems, like MRI. Using the system, Dr. Boto has measured brain activity arising from natural tasks: these include bouncing a ping-pong ball on a bat; measurements in children as young as 2 years old; language lateralisation measurements to aid pre-surgical planning; experiments using an Occulus Rift virtual reality headset to provide an immersive and realistic environment; investigations of motor learning and measurements of deep brain structures such as the cerebellum. In this talk Dr. Boto will discuss MEG, its potential, its pitfalls, and how quantum technologies are initiating a revolution. She will present the development of the system, describing the fundamental physics that enables quantum sensing, and the myriad engineering challenges that had to be solved in order to turn the basic idea into a working prototype. Dr. Boto will also discuss the future, and the role that quantum enabled functional imaging might play in developing our understanding of the human brain, in health and disease.

FRIDAY, APRIL 23 at 11:00 a.m.

This seminar will be webcast live at fbri.vtc.vt.edu/events/live-webcast and via Zoom at https://virginiatech.zoom.us/j/81798701758.

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