Department of Biomedical Engineering
2011-2012 Seminar Series

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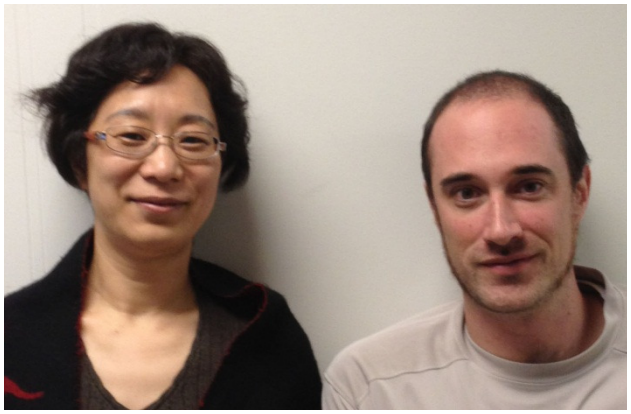
614 Schermerhorn



"Reversing Transduction: Sounds Coming Out of Your Ear"

Christopher Bergevin and Wei Dong

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Somehow in the process of being a remarkably sensitive detector of sound pressure, the healthy ear emits sound as well. These 'otoacoustic emissions' (OAEs) were initially demonstrated by David Kemp in 1978 by means of a sensitive microphone in the ear canal. Subsequently, OAEs revolutionized how we think the inner ear converts mechanical vibrations into neural signals (i.e., forward transduction). These emissions provide compelling evidence for a cell-based, nonlinear amplification process at work in the ear (i.e., reverse transduction), and furthermore have had a significant clinical impact (e.g., newborn hearing screening). Scientifically, OAEs are a double-edged sword: While they provide a non-invasive window into the healthy inner ear (where physiological access is otherwise extremely difficult), they essentially represent an *inverse problem*. Put another way, OAEs as measured at the eardrum are a sum of multiple components originating from different regions and mechanisms in the inner ear. Further improving the utility of OAEs is challenging, as it requires elucidation of the origin of these multiple components by means of intracochlear physiology and various signal-processing strategies.

Dr. Christopher Bergevin has a background in mathematics and physics, having earned his PhD at the Massachusetts Institute of Technology (2007). He has a strong interest in comparative studies that consider auditory function across a wide variety of species (e.g., humans, lizards, monkeys, tigers, etc....). Dr. Wei Dong has a background in biophysics and physiology, having earned her PhD at the University of Bristol, UK (2002). Her research interests focus primarily on physiologically measuring the complex mechanics occurring inside the cochlea.