

## SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Faculty of Engineering

Website: <https://www.eng.nus.edu.sg/ece/>

**Area: Microwave & Radio Frequency**

**Host: Dr John S. Ho**

<b>TOPIC</b>	:	<b>Noise-Enhanced Physiological Sensing Using A Stochastic-Resonant Wireless Sensor</b>
<b>SPEAKER</b>	:	<b>Mr Li Zhipeng Graduate Student, ECE Dept, NUS</b>
<b>DATE</b>	:	<b>Tuesday, 6 April 2021</b>
<b>TIME</b>	:	<b>4.00PM to 5.00PM</b>
<b>WEBINAR</b>	:	<b>Join Zoom Meeting</b> <a href="https://nus-sg.zoom.us/j/81969101643?pwd=cGttWkY0RHJQazZuby9xbWFZeFoxdz09">https://nus-sg.zoom.us/j/81969101643?pwd=cGttWkY0RHJQazZuby9xbWFZeFoxdz09</a> <b>Meeting ID: 819 6910 1643</b> <b>Password: 581658</b>

### ABSTRACT

Wearable physiological monitors using flexible electronic devices and wireless technologies are critical for future healthcare systems in which diagnostics are personalized based on daily activities. However, the environmental noise during daily activities can hinder the long-term monitoring of weak physiological signals, which should be suppressed if possible but remains mostly unexplored. While otherwise detrimental, noise can play a beneficial role in enhancing the sensory perception in nonlinear systems such as neurons, a counterintuitive phenomenon called stochastic resonance (SR). Here we propose a noise-enhanced wireless physiological monitoring using a neuron-inspired stochastic-resonant sensor. Our system consists of two coupled parity-time (PT)-symmetric resonators, where the nonlinearity comes from PT phase transition at an exceptional point (EP), the bifurcation point at which both eigenvalues and eigenvectors coalesce. We implement this PT-symmetric system using a skin-interfaced inductor-capacitor (LC) sensor and a wireless-coupled textile reader. We characterize the SR in PT-symmetric system by showing the maximized signal-to-noise ratio (SNR) under optimal noise level. We then demonstrate the wireless monitoring of physiological states with enhanced SNR by environmental noise during exercise.

### BIOGRAPHY

Mr Li Zhipeng is currently a PhD student in Department of Electrical and Computer Engineering NUS, supervised by Assis. Prof. John S. Ho and Assoc. Prof. Chengwei Qiu. His current research interest focuses on wireless sensors and metamaterials in microwaves.

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