



**THE CHINESE UNIVERSITY OF HONG KONG**  
Department of Information Engineering  
*Seminar*

**NOMA Assisted Far-Field and Near-Field Communications**

**By**

**Prof. DING Zhiguo**

**The University of Manchester, UK**

**Date : 25 June 2024 (Tuesday)**

**Time : 10:30am – 11:30am**

**Venue : Rm 801, Ho Sin Hang Engineering Building, CUHK**

*Abstract*

One recent advance in non-orthogonal multiple access (NOMA) is its use as an add-on in a massive multiple-input multiple-output (m-MIMO) based legacy space division multiple access (SDMA) network, where spatial beams preconfigured for legacy users are used to serve additional users. As a result, the connectivity and the overall system throughput of SDMA can be improved in a low-complexity and spectrally efficient manner. For conventional SDMA networks based on far-field communications, this application of NOMA is intuitive, since the far-field spatial beams are cone-shaped. Recently near-field communications have received a lot of attention as, for high carrier frequencies and large numbers of antennas, the Rayleigh distance becomes significantly large. Unlike far-field communications, the spherical-wave channel model has to be used for nearfield communications, which motivates the use of beam-focusing, i.e., a beam is focused on not only a spatial direction but also a specific location. This talk is to focus on the resolution of near-field beam-focusing and how it can be used to facilitate the application of NOMA for the coexistence between near-field and far-field communications.

*Biography*

Zhiguo Ding received his B.Eng in Electrical Engineering from the Beijing University of Posts and Telecommunications in 2000, and the Ph.D degree in Electrical Engineering from Imperial College London in 2005. He is currently a Professor in Communications at University of Manchester and Khalifa University. Previously, he had been working in Queen's University Belfast, Imperial College, Newcastle University and Lancaster University. From Oct. 2012 to Sept. 2024, he has also been an academic visitor in Prof. Vincent Poor's group at Princeton University. Dr Ding' research interests are machine learning, B5G networks, cooperative and energy harvesting networks and statistical signal processing. His h-index is over 100 and his work receives 50,000+ Google citations. He is serving as an Area Editor for the IEEE TWC and OJ-COMS, an Editor for IEEE TVT, COMST, and OJ-SP, and was an Editor for IEEE TCOM, IEEE WCL, IEEE CL and WCMC. He received the best paper award of IET ICWMC-2009 and IEEE WCSP-2014, the EU Marie Curie Fellowship 2012-2014, the Top IEEE TVT Editor 2017, IEEE Heinrich Hertz Award 2018, IEEE Jack Neubauer Memorial Award 2018, IEEE Best Signal Processing Letter Award 2018, Alexander von Humboldt Foundation Friedrich Wilhelm Bessel Research Award 2020, IEEE SPCC Technical Recognition Award 2021, and IEEE VTS Best Magazine Paper Award 2023. He is a Web of Science Highly Cited Researcher in two disciplines (2019-2023), an IEEE ComSoc Distinguished Lecturer, and a Fellow of the IEEE.

**\*\* ALL ARE WELCOME \*\***