# 中国矿业大学电气工程学科海外学者讲坛

| Lecture Title | Presenter |
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| Fundamentals of Multilevel Neutral-Point-Clamped Dual-Active-Bridge DC-DC Conversion | Professor Sergio Busquets Monge |
| Robustness and Reliability of SiC MOSFETs | Professor Layi Alatise |

**时间：2025年4月9日 14:00-16:00**

**地点：经管学院B117报告厅**

## Professor Sergio Busquets Monge

**Universitat Politècnica de Catalunya (UPC)**

**加泰罗尼亚理工大学**

**Senior Member of IEEE**

## Research Interests

- **Modular and scalable power converter design**
- **Multilevel power conversion**
- **Electric vehicles**

**Sergio 教授将针对多电平中点钳位型DAB变换器做1场讲座**

# Lecture 1: Fundamentals of Multilevel Neutral-Point-Clamped Dual-Active-Bridge DC-DC Conversion

**Abstract:** This lecture will initially present Spain, its main Universities, and its main Power Electronics research groups, with a special attention to Universitat Politècnica de Catalunya (UPC). Subsequently, it will cover the fundamentals of multilevel neutral-point-clamped (NPC) dual-active-bridge (DAB) dc-dc conversion, from the perspective of the research carried out at the Advanced Control and Power Electronics Systems group of UPC. The DAB is a popular, efficient, and versatile bidirectional dc-dc power converter offering galvanic isolation and substantial voltage/current scaling capabilities, that is nowadays widely used in many applications. The extension of this converter to a higher number of levels through NPC topologies has been the subject of intensive research in the past decade, mainly since this enables operating at higher dc-link voltages, or it enables operating with more economical higher-performance lower-voltage-rated devices. The talk will discuss its basic operating principle, and the development of suitable modulation and closed-loop control strategies, with the main goal of demonstrating the feasibility of ensuring dc-link capacitor voltage balance for any number of levels and exploring the optimization of other performance features. The most simple case, the three-level case, will be treated more in depth.

## Professor Layi Alatise

University of Warwick (华威大学)

Royal Society Industry Fellow

Senior Member of IEEE

## Research Interests

- Advanced power semiconductor materials and devices for improved energy conversion
- Power electronic converters and systems
- Energy conversion in electrical and power systems

**Layi 教授将针对碳化硅MOSFET器件做1场讲座**

## Lecture 2: Robustness and Reliability of SiC MOSFETs

**Abstract:** Wide bandgap power devices like SiC MOSFETs and GaN e-HEMTs are currently revolutionizing power electronics. They enable high switching speeds, high frequency operation and high-power density power electronic converters. As these devices come into the mainstream, the question of robustness and reliability becomes more important. This talk will introduce some robustness and reliability metrics used to assess these WBG devices. The performance of these devices under short circuits, unclamped inductive switching and bias-temperature instability will be assessed. The trade-offs between high performance and high reliability will be assessed. The talk will also discuss the qualification of these devices for automotive applications.

# 联系人及承办单位

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**欢迎各位老师、同学踊跃参加！**