

## PhD studentship (Full-time)

Institution	Xi'an Jiaotong-Liverpool University, China
School	School of Chips
Supervisors	<p><b>Principal supervisor:</b>  Prof. Dr. Amer Kotb  Electronics, Xi'an Jiaotong-Liverpool University, China  Fayoun University, Egypt</p> <p><b>Co-supervisor:</b>  Prof. Dr. Wei Chen  Nanomaterials, Dean of School of Chips, Xi'an Jiaotong-Liverpool University, China</p> <p><b>Co-supervisor:</b>  Dr. Ian Sandall  Semiconductor Devices, Liverpool University, England</p> <p><b>External co-supervisor:</b>  Prof. Dr. Kyriakos Zoiros  Optical Communications, Democritus University of Thrace (DUTH), Greece.</p>
Application Deadline	Open until the position is filled
Funding Availability	Funded PhD project (world-wide students)
Project Title	All-optical combinational logic circuits using carrier reservoir semiconductor optical amplifier
Contact	<p>Please email <a href="mailto:amer.kotb@xjtlu.edu.cn">amer.kotb@xjtlu.edu.cn</a> (XJTLU principal supervisor's email address) with a subject line of the PhD project title.</p> <p>The principal supervisor's profile is linked here:  <a href="https://scholar.xjtlu.edu.cn/en/persons/AmerKotb">https://scholar.xjtlu.edu.cn/en/persons/AmerKotb</a></p>

### **Requirements:**

The candidate should have a first class or upper second class honours degree, or a master's degree (or equivalent qualification), in Physics, Electronics, Optical Engineering, Electrical Engineering, or any related field.

Evidence of good spoken and written English is essential. The candidate should have an IELTS score of 6.5 or above, if the first language is not English. This position is open to all qualified candidates irrespective of nationality.

### **Degree:**

The student will be awarded a PhD degree from the University of Liverpool (UK) upon successful completion of the program.

### **Funding:**

The PhD studentship is available for three years subject to satisfactory progress by the student. The award covers tuition fees for three years (currently equivalent to RMB 99,000 per annum). It also provides up to RMB 16,500 to allow participation at international conferences during the period of the award. The scholarship holders are expected to conduct the majority of their research at XJTLU in Suzhou, China. However, they may apply for a short-term research visit to the University of Liverpool if the project requires it.

### **Project Description:**

This study investigates the utilization of carrier reservoir semiconductor optical amplifiers (CR-SOAs) in advancing all-optical data processing systems, emphasizing speed, energy efficiency, and scalability. It highlights significant progress in CR-SOA-based combinational logic systems, including half adders, subtractors, digital-to-analog converters, and encryption mechanisms. A key focus is placed on the integration of CR-SOAs with Mach-Zehnder interferometers (MZIs) or delayed interferometers (DIs) for the design of high-speed components such as parity generators, memory units, and comparators, demonstrating the potential to replace conventional electronic components for enhanced performance. Performance metrics, including the quality factor (QF), bit error rate (BER), and extinction ratio (ER), are evaluated to optimize CR-SOA parameters. The findings underscore the feasibility of cascading CR-SOA-based circuits with MZI or DI configurations to construct complex optical logic architectures, showcasing their versatility and transformative potential in optical computing, high-speed data communication, and real-time data processing applications.

For more information about doctoral scholarship and PhD programme at Xi'an Jiaotong-Liverpool University (XJTLU), please visit

<https://www.xjtlu.edu.cn/en/admissions/global/entry-requirements/>

<https://www.xjtlu.edu.cn/en/admissions/global/fees-and-scholarship>

### **How to Apply:**

Interested applicants are advised to email [amer.kotb@xjtlu.edu.cn](mailto:amer.kotb@xjtlu.edu.cn) (XJTLU principal supervisor's email address) the following documents for initial review and assessment (please put the project title in the subject line).

- CV
- Three formal reference letters
- Personal statement outlining your interest in the position
- Certificates of English language qualifications (IELTS of 6.5 or equivalent)
- Full academic transcripts in both Chinese and English (for international students, only the English version is required)
- Verified certificates of education qualifications in both Chinese and English (for

international students, only the English version is required)

- PDF copy of Master Degree dissertation (or an equivalent writing sample) and examiners reports available