SPIE Student Chapter of
Beijing University of Posts and Telecommunications

Annual Report

(October. 2015---October. 2016)
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Introduction

SPIE student chapter of Beijing University of Posts and Telecommunications (BUPT) is an academic association for senior undergraduates, postgraduates and PhD students, supervised by the academic committee of Beijing University of Posts and Telecommunications. By carrying out a variety of academic activities, paying close attention to the development of science and industry, the club aims to foster an interest in optoelectronics profession, enhance the communication among students, universities and companies. The club will make all the members more competitive in the academic research area, job career, and international committees.

During the last academic year, which was the eighth year of this newly established students club, we have organized several activities to fulfill the main objectives of the Club. Concerning the Club’s academic objective, we invited Dr Hao Qin to deliver a lecture with the topic “Side channel attack on a practical continuous-variable quantum key distribution system by inserting an external light” to the Club members, and our BUPT SPIE Student Chapter representatives attended the Student Leader Workshop of Beijing, in Capital University. We also encourage members to participate in international conferences and forums, such as the Student Leader Workshop on Optics and Photonics 2016 held in San Diego, which provides opportunities to be closer to the optical industry. In addition, outgoing activities fulfill members with a much more colorful academic life.

For the upcoming year, 2017, we have recruited new student members, and new officers have been elected. Some activities have already been planned. In addition, we will keep on working together with OSA BUPT Student Chapter and make great efforts to bring more benefits to our members. We are looking forward to the more bright future of this SPIE student chapter.
Club Members for the Year of 2016

There are 55 members in our club for the year of 2016:

Officers:

President: Jieyu Ning ningjieyu@bupt.edu.cn
Vice President: Chunjing Yin yincj@bupt.edu.cn
Secretary: Yichen Zhang zhangyc@bupt.edu.cn
Treasurer: Yi Lei leiyi@bupt.edu.cn

Advisors

Chief Advisor

Prof. Chongxiu Yu
SPIE member. Academic director of Optics and Optical Engineering, the Inspection Security Technology Expert of the National Bureau of Quality Supervision; Vice Chairman of the Chinese Optical Society of Hologram and All Optical Information processing professional Committee; Director of Research Center of Optoelectronics Material and Devices, the State Key Laboratory of Information Photonics and Optical Communications.

Advisors Committee

Prof. Jintong Lin
IET Fellow; CIC Fellow; Hon. Dr. of Sci., Univ. of Southampton; Executive member of the China Institute of Communications; Former President of BUPT.

Prof. Xiaomin Ren
SPIE member; IET Fellow; Senior member of Chinese Optical Society; Vice President of BUPT; Chairman of Academic Committee of BUPT; Director of the State Key Laboratory of Information Photonics and Optical Communications.
Prof. Wanyi Gu

Member of the China Institute of Communications; Vice Chairman of Academic Committee of BUPT; Vice Director of the State Key Laboratory of Information Photonics and Optical Communications.

Prof. Yuefeng Ji

CIC Fellow; Member of the China Institute of Communications; Executive Director of Institute of Information Photonics and Optical Communications of BUPT; Deputy Director of the State Key Laboratory of Information Photonics and Optical Communications.

Prof. Xue Chen

Member of China Institute of Communications; Vice Chairman of Academic Committee of the State Key Laboratory of Information Photonics and Optical Communications; Director of Research Center of Optical Communication System and Photonic Network, the State Key Laboratory of Information Photonics and Optical Communications.

Prof. Xiaoguang Zhang

Director of Research Center of Fundamentals of Information Photonics, the State Key Laboratory of Information Photonics and Optical Communications.

Prof. Kun Xu

SPIE member; Vice Director of the State Key Laboratory of Information Photonics and Optical Communications.
Chapter Activities

- Lecture on “Side channel attack on a practical continuous-variable quantum key distribution system by inserting an external light”

Date: Dec. 10, 2015, Thursday 9:00 am – 11:30 am
Place: Meeting Room 313 of the Research Building

Dr. Qin Hao comes from quantum information team of TELECOM ParisTech. His mentor is Romain Alleaume. Their group in the field of the coherent state of continuous variable quantum key distribution (CV-QKD) published a number of important research results. For example, at present the farthest transmission distance (80km) in CV-QKD implementation in the world from their group; The first commercial product of CV-QKD was also originated from their group, and they held the forth Qcrypt Meeting in 2014. Dr. Qin Hao doctoral research direction aimed at side channel attack on CV-QKD, in the actual safety of CV-QKD implementation system has an in-depth research and understanding. In 2003, Dr. Qin Hao proposed detector saturation attack scheme, this scheme would affect the actual safety of CV-QKD implementation system in using balanced detector. He was invited to give a lecture about “Side channel attack on a practical continuous-variable quantum key distribution system by inserting an external light” in Beijing University of Posts and Telecommunications. This lecture is mainly about side channel attacks in CV-QKD and External laser attack in CV-QKD. Members of quantum information team of the institute of information photonics and optical communications and Professor YuSong participated in this lecture.

Dr. Qin Hao reported a quantum hacking strategy on a continuous-variable (CV) quantum key distribution (QKD) system by inserting an external light. In the implementations of CV-QKD systems, transmitting openly local oscillator pulses is a potential vulnerability for an eavesdropper to launch side channel attacks. In this work, other than targeting on local oscillator, their team concern two imperfections in a balanced homodyne detector used in CV-QKD system: the imbalance in the beam splitter and the finite linear detection limit. Inspired by blinding attack in discrete-variable QKD, their team formalize an attack strategy by inserting an external laser into a CV-QKD system with Gaussian-modulated coherent state protocol and show that this attack can compromise its practical security. According to their analysis, if one inserts an external laser into homodyne detector’s signal port, due to the imbalance of the beam splitter, the external laser contributes a displacement on homodyne output signal which can cause detector electronics saturation. In consequence, Bob’s quadrature measurement is not linear with the quadrature sent by Alice. By considering such vulnerability, a potential Eve can launch a full intercept-resend attack meanwhile she inserts an external laser into Bob’s signal port. By selecting proper properties of the external laser, Eve actively controls the induced displacement value from the
inserted laser which results saturation of homodyne detection. In consequence, Eve can bias the excess noise estimation due to the intercept-resend attack and the external laser, such that Alice and Bob believe their excess noise estimation is below the null key threshold and they can still share a secret key. This attack shows that the detector loopholes also exist in CV-QKD, and it seems influence all the CV-QKD systems using homodyne detections, since all the practical detectors have finite detection range.

After the lecture, Dr. Qin Hao held interactions with other students and teachers in the topic of “Side channel attack on a practical continuous-variable quantum key distribution system by inserting an external light”. Many students talked about the quantum communication developments and innovations with Dr. Qin Hao and put forward their own suggestions. Dr. Qin Hao answered all the questions from other teachers and students. A much more in-depth discussion about the quantum communication innovations is realized in the process.

After the discussion, Dr. Qin Hao visited our laboratories, he highly recommended the research environments and enthusiasm in the BUPT Optical Laboratory.

In the end, Dr. Qin Hao took pictures with all of the teachers and students participated in this lecture. Then the president of the BUPT SPIE student chapter presented flowers and gifts to Dr. Qin Hao to thank him for his excellent speech.
Dr. Qin Hao in the workshop

The group photo after the lecture
The Student Leader Workshop of Beijing

Date: December 6, 2015
Place: Capital Normal University, Beijing

Mr. Yichen Zhang and Mr. Xiangyu Wang represented our BUPT SPIE Student Chapter to attend the Student Leader Workshop of Beijing, in Capital University. During this one days’ event, students from 7 SPIE Chapters of Beijing shared the experience of boosting the development of SPIE student chapter. We want to expand our influence among all the universities of Beijing, through which we can attract more student to devote in optics and photonics field. In the morning, 6 students from different chapters gave us excellent technical lectures about their research area, Mr. Yichen Zhang represented BUPT chapter to give a presentation about continuous-variable quantum key distribution. Through this workshop, we knew more about other chapters, we established very good relationships, making a successful example of interaction among Beijing universities, which benefit both the SPIE chapters and all the universities. We also decided to hold more activities together in the future.
Attended oversea conferences

♦ The Student Leader Workshop on Optics and Photonics 2016

Date: August 27-September 1, 2016
Place: San Diego, USA

Ms. Yi Lei represented our BUPT SPIE Student Chapter to attend the Student Leader Workshop on Optics and Photonics 2016, in San Diego, CA, USA. During the highly interactive at the first day, Ms. Yi Lei has discussed with other student chapter leaders from around the world on what being a leader is all about (and what it is not about), how to communicate across cultures, and how to go from ideas to achievements for our chapter. Through the sharing of experiences and exchanging of ideas, Ms. Yi Lei not only gained new insights in chapter managements, but also established a good networking relationships with other student chapters, and really had a rich and enjoyable days at the conference.
Ms. Yi Lei attending the Optics and Photonics conference

Ms. Yi Lei presenting the poster of BUPT student chapter

Ms. Yi Lei introducing our BUPT student chapter to other student chapters
Ms. Yi Lei with Ms. Tasha Chicovsky and Ms. Meg Harris, the Student Activity Coordinators of SPIE

Ms. Yi Lei with the student leaders from India
The 10th International Workshop on Optical Signal Processing and Optical Switching (IWOO)

Date: November 15th - 17th, 2015
Place: Beijing, China

The rapid convergence of data and media stream and diverse service applications are driving the network evolutions. It is clearly beneficial to switch and route optical packets, bursts, and circuits in all-optical form. The International Workshop (IWOO) has originally been focusing on Optical Packet Switching (OPS) and Optical Code Division Multiple Access (OCDMA). The workshop includes a number of keynote/invited talks by distinguished researchers from well-known universities and research institutes.

Some of our members attended IWOO 2015 conference and was responsible for part of the organization. At the preparing stage, they discussed about over and over, arranged the schedule of the conference making sure it goes well and guests won't be confused. Considering foreign guests, they even made translation of common words at the manual for convenience. They are so sweet and careful.

The conference lasted 3 days, consisted keynote speeches, session speeches, a panel discussion, an exhibition and other events. At the first day morning, we listened to the keynote speech made by
Weisheng Hu about architecture and key technology of a clouding fiber and radio access network. Some key technologies were discussed in detail, which are cyclic AWG, tunable transmitter, user migration, and transmission of multiple wavelengths at different wavelength bands. At the afternoon, a teacher of some members, Yue Zhou, gave a session speech about Ultrafast Microwave Photonics. In the talk, unique applications of ultrafast lasers in microwave photonics research is reviewed and discussed, such as ultra-low phase noise microwave generation, attosecond-precision timing distribution and synchronization between RF and optical systems, and high precision photonic analogue to digital conversion.

Some members also attended the banquet of the conference at which they made discussions with guests and learned a lot from them. We improved many skills and learned more advanced technologies. It's quite a wonderful experience.

A session speech at the conference
Outings and Activities

Team building (Skiing)

Date: January 26th, 2016, Tuesday 9:00 am-15:00 am
Place: Huairou District, Beijing, China

Severe winter, the ski event organized by Beijing University of Posts and Telecommunications SPIE branch was carried out on January 26, 2016 in Huairou District, Beijing. It is the first time that we hold the orientation through outdoor activity this year. To a great extent, through this special way, the senior members and junior members have made an in-depth communication. At the same time, all the participators have made friends with each other.

This activity organized around thirty members, on the same day starting at 9:00 a.m. After the completion of the rental skis and ski suits and some other necessary preparations had been done, everyone went to skiing. Old and new members helped each other and mutual exchanged skiing skills. Even if they fell down time and time again, they still had a great interest in skiing. Because it was really exciting and they experienced a great sense of accomplishment and satisfaction after the gradual success. After a whole day’s trip, everyone was extremely tired but all of us had a blast. From this activity, not only members made friends with each other and mastered a skill, but also,
they knew how to overcome our psychological fears and how to make the first step when they got stuck or learned some new things. Overall, the event was successfully held.

Student members attending in Skiing

✧ Team building (Badminton Competition)

**Date:** May 4th - May 13th, 2016  
**Place:** BUPT Stadium, Haidian District, Beijing, China

Nowadays most of the young people ignore their health condition and exercise little. Students, especially, spend more time on their study and tend to play computer games during their spare time. In order to highlight the importance of health, encourage students to do more exercise and help them relax, we organized a badminton competition among members.

It is the first time we organized a competition. In the process of planning this activity, the senior members have made a lot of work to guarantee the activity. First of all, we encouraged members to participate in the activity, then we checked time with every member and made a schedule. We booked the badminton court and announced everyone. There are five terms set in the competition including singles, doubles and mixed doubles. Athletes fought hard and audience cheered loudly for their favorite teams, our enthusiasm ran high during the competition. At the end we presented the trophies to the winners and took pictures for memory. We all enjoyed the process and hoped to attend more activities like this.
Through this way, the senior members and junior members have made an in-depth communication, all the participators have made friends with each other. At the same time, members were more interested in playing badminton and organized activities by themselves more often. It's good for our health. From this activity, we also mastered a skill, and learned not to give up easily, but always keep the faith, and trust our teammates.
Preview of planned activities for 2016

1. Invite experts in optics and photonics to give a lecture at BUPT;
2. Organize regular physical excise activities, such as badminton or ski;
3. Organize outings and activities for our members;
4. Organize outings and activities to propagate optical knowledge.
# Financial Statement

**Financial Report for BUPT SPIE Student Chapter**

**Jan 1st, 2016-Oct 1st, 2016**

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<th>Description</th>
<th>Price (CNY)</th>
<th>Total (USD)</th>
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<tr>
<td>Ending Balance of last year</td>
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<tr>
<td>Beginning Balance (SPIE supported club activity grant)</td>
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<td>$1,442</td>
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<td>Recruiting fees</td>
<td>3930</td>
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<tr>
<td>Lecture (Inviting Dr. Qin Hao)</td>
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<td>Academic conference in Beijing</td>
<td>654</td>
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<td>Attended oversea conferences</td>
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<tr>
<td>Team building (Skiing)</td>
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<tr>
<td>Team building (Badminton Competition)</td>
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<td>Chapter officer regular meeting</td>
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<td>Propagation and promotional materials</td>
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<td><strong>Total Expense</strong></td>
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<td><strong>Ending Balance</strong></td>
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Beijing University of Posts and Telecommunications
SPIE Student Chapter

Treasurer (Signature):

Nov. 17th, 2016