The Department of Physics at Fudan University

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1. Fudan University

As one of the national topmost institutions of advanced learning and higher education, Fudan has achieved worldwide fame throughout its venerable past. The University was established by Ma Xiang-bo in 1905. "Fudan" found its lexical origin in the quotation "Heavenly light shines day after day" taken from "Annotations of Yu and Xia" (Yu Xia Zhuan) of Scholia of The Collection of Archaic Texts (Shang Shu Da Zhuan).

Fudan consists of 28 schools and departments, with seventy undergraduate disciplines. The University confers bachelor's degrees in seventy academic disciplines, and master's degrees in two hundred and twenty nine disciplines (with fifty-one of them established by the University itself), and doctoral degrees in twenty-four Level I and one hundred and fifty-four Level II academic disciplines (with thirty of them established by the University itself). There are also twenty-nine research stations that offer postdoctoral fellowships.

The single and solitary goal of Fudan is to cultivate more and more all-round talents for modern China. Emulating the other successful institutions of tertiary and quaternary education at home and abroad, the University has been carrying out a series of daring experiments to integrate the various disciplines of learning and to utilize the abundant resources of a comprehensive university. After years of exploring and practicing, Fudan has now established its own curriculum and management system, both of which are unique and progressively improving.

2. Foundation of the department of physics

The Physics Department of Fudan University was founded in 1952, seeded from the physics group in the former Department of Mathematics and Physics at Fudan. Under the nation-wide reorganizational effort within universities located close by, the physics departments of 8 universities in East China, including Fudan University, Jiaotong University, Tongji University, Zhejiang University, Hujiang University and
Datong University, were partly merged into one department, the Physics Department of Fudan University.

In the past six decades, the Department has experienced a colorful and fruitful but hard and complicated course. It kept proliferation and fission, derived Physics Department II, Electronic Engineering Department, the Light and Illumination Department, the Material Science Department, and the Computer Science Department, making significant contributions to the growth and completeness of Fudan University. Meanwhile, the Department itself has been developing into one of the key centers for physics research and education in China.

Fig.3: The Physics Building of Fudan University

3. Present Status of the department of physics

(1) Faculty

Present faculty of the Department mainly consists of 49 full professors and 18 associate professors, together with 16 technicians. Among the faculty members 7 are academicians of Chinese Academy of Sciences, 3 was included in the “1000-Elite Program”, 6 were the winners of “Chang Jiang Scholar Award Project” issued by the Ministry of Education; 12 were awarded the National Funds for Distinguished Young, 7 were included by the national “1000-Youth-Elite Program”, 4 were the chief scientist of the National Basic Research Program (973 Program) and 5 were awarded the “APS Fellow”. Many faculty members were and are in charge of different international academic and domestic organizations and were awarded important international and domestic Physics Awards.

(2) Main Fields and Achievements of Teaching and Research

Today, the Physics Department includes 3 academic subsidiary disciplines: (each is of both the national key discipline and doctoral cultivating unit): theoretical physics, condensed matter physics and optics, corresponding to each of them a specialty for graduate students is set up. Two specialties, i.e. the physics and applied physics, are set up for undergraduate students. The Department runs 3 key labs: the State Key Laboratory of Surface Physics, Key Laboratory of Matter Computational
Sciences and Key Laboratory of Micro-/Nano-Photonic Structure, the latter two are sponsored by the Ministry of Education. Main research fields of the faculty include atomic, molecular and optical physics, condensed matter physics, particle physics, gravitation, cosmology and black hole physics, physical biology, and other physics related interdisciplines.

Of all the courses the Department opens up 5 have been chosen as national exquisite courses, 1 has been chosen as municipal exquisite course, 3 have been chosen as university exquisite courses. The Fudan Physics Teaching Lab has been chosen as National Experimental Teaching Demonstration Center and the Civilized Team of Shanghai Education System.

The Department faculty had and have taken many national research projects. A number of valuable papers have been published by various international and domestic academic periodicals. Since 2006 the number of the papers published by the international leading professional journal Phys. Rev. Lett adds up to more than 30, while 8 papers have been published by most famous journal “Nature” and its related subsidiary periodicals such as Nature Materials, Nature Photonics, Nature Physics, etc. The faculty had been awarded a number of high level research awards such as Second Prize of National Natural Science Prize.

(3) Training

Each year the Department enrolls about 100 undergraduate freshmen. Since 2012, the Department starts to try the “long cultivation system” for graduate students. It is expected to enroll 80-90 Ph.D. candidates each year. The Department will enroll directly the Bachelors as part of the 80-90 doctoral candidates, they will spend 5~7 years to finish the doctoral program, and will be referred to as direct doctoral candidates hereafter. Meanwhile the Department also enrolls the Masters as other doctoral candidates, and spends 3~5 years to cultivate them to finish their doctoral programs. These candidates will be referred to as regular doctoral candidates. The direct doctoral candidates are asked to be qualified before their status of doctoral candidate will be cancelled, otherwise they will be reconsidered and cultivated as the applicants for Master Degree rather than Doctoral Degree.

Many undergraduate students were awarded various prizes for students like “Challenge Cup” prize. Five graduated doctors have been the authors of “National Outstanding Doctoral Thesis”

Up to now the Department has cultivated more than 9000 students. They have distinguished themselves with their academic, educational, economic or governmental careers. More than 20 graduates have been elected as the academicians of Chinese Academy of Sciences or Chinese Academy of Engineering, two of them have been awarded the Oliver E. Buckley Prize.

(4) Labs

The Department runs 3 key labs: the State Key Laboratory of Surface Physics, Key Laboratory of Computational Physical Sciences and Key Laboratory of Micro- and Nano-Photonic Structures, the latter two are sponsored by the Ministry of Education.
4. State Key Laboratory of Surface Physics, Fudan University

Sponsored by the State Planning Commission, the State Key Laboratory of Surface Physics (SKLSP), Fudan University started to be established in 1990, which was proposed by the eminent physicist Prof. Xide Xie. The SKLSP had officially opened to the public at the end of Dec., 1992.

The first director of the laboratory academic committee was Prof. Xide Xie, academician of the Chinese Academy of Sciences and the first director of the Laboratory was academician Xun Wang. The leading body of the lab had been successively elected for three times. The present director of the laboratory academic committee is Prof. Dingsheng Wang, and Prof. Donglai Feng serves as the director of the Laboratory.

SKLSP is based on the multi-discipline intergradations of computational condensed matter physics, semiconductor surface and interface physics, semiconductor optoelectronic physics and ultra-thin magnetic film physics, majoring in the directions of semiconductor surface, interface and optoelectronic physics to contribute to the development of new generation information science and technology of China.

The laboratory is mainly engaged in the research in the following four subjects:
1) the novel properties of surface and interface;
2) optical physics and application of surface and micro-structure;
3) theory and computational physics of surface and interface;
4) interface problems related to the soft matter and bio-physics.

Each research activity of the laboratory is cooperatively carried out by several research groups.

SKLSP possess a galaxy of highly qualified scientists. Currently among 51 staff members (36% of them are under 40 years old), 2 are academicians of the Chinese Academy of Sciences, 1 is included in the “1000-Elite Program”, 3 are included in the
“1000-Youth-Elite Program”. The staff of the Laboratory have been awarded National Funds for Distinguished Young Scientists for 10 person-times, and chosen as the “Chang Jiang Scholar ” issued by the Ministry of Education for 6 person-times. Besides, 4 were or are the New Century Talents issued by the Ministry of Education. These highly qualified scientists inject fresh blood into the Lab, and also achieve remarkable achievements constantly.

SKLSP is equipped with a large number of sophisticated equipments, of which are 26 large-scale apparatuses (each costs more than RMB 3 hundred thousand Yuan). The Lab stresses and strengthens the cooperation among the research groups and most of the large-scale instruments are opened to and shared with other research groups.

The Laboratory attaches great importance to the international and domestic academic collaboration and exchange. So far many international and domestic cooperative programs have been carried out with universities and laboratories home and abroad by the programs of “Opening Project” and “Senior Visiting Scholar ”. Now SKLSP is making all efforts to reach its goal of contributing to the development of basic subjects in China.

5. Fudan Physics Teaching Lab

The Fudan Physics Teaching Lab was formerly known as the physics laboratory founded in 1952. With the continuous development of the education reform, in 1998 the Physics Teaching Lab (hereinafter referred to as the Lab) was established by combining the original general physics laboratory, modern physics laboratory and physics demonstration laboratory, and then became an important part of National Basic Science Talent (science) Training Base ---- Fudan University Physics Base.

The Lab was honored as the Shanghai Municipal Experimental Teaching Demonstration Center in 2006, and selected as the National Experimental Teaching Demonstration Center in 2013. Thanks to Laboratory teachers’ love and dedication, as well as their enthusiasm to the experimental teaching, fruitful results have been achieved: "university physics experiment” (2008), “liberal arts physics (theoretical and experimental)” (2009), and “modern physics experiments” (2010) have been granted as national exquisite courses. Every year, many teachers were honored awards at various levels. The Lab was named as the Shanghai Municipal Education System Civilized Team in 2010, and won the honorary title of the Shanghai Municipal Education Pioneer in 2011.

6. Prospects

In three years a new Physics Building will be built on Jiangwan campus. It will cover an area over 7 acres ,and provide the faculty and students with modern facilities and commodious functional rooms for their academic researching, teaching and interflowing, including advanced labs, modern lecture halls, each of which can hold an audience of 300 or 150, and spacious libraries.

Next five years will be a crucial period for the development of Physics Department. On one hand , the good development posture in the field of condensed matter Physics and the domestic leading position in some of its sub-fields should be retained and further developed to match the international advanced level; on the other hand, the research in the fields of theoretical physics, computational physics, soft matter and physics biology ,and optics will be strengthened. Besides, a new
subsidiary discipline of nuclear and particle physics will also be established. It is expected that more and more young talents will join us to devote ourselves to the research, popularization and application of physics.