

International Summer School
Physics and Future Technological Change

Aug 1st-Aug 14th, 2022

Harbin Institute of Technology, Harbin, P.R.China

About Program

The Summer School International program “Physics and Future Technological Change” will run from July 31 to August 14 in 2022 organized by School of Physics in HIT. Based on the big scientific project "ground simulation device of space environment", which reveals the evolution law of material structure and the physical essence of various effects under space environmental conditions, the international courses and lectures of "condensed matter physics", "plasma physics", "optics" and other disciplines will be held online.

Based on the international frontier basic research of physics, with the help of our strong foundation of international cooperation in the field of plasma, this summer school introduces well-known physical science experts, and offers courses for undergraduates in physics and related disciplines all around the world, such as magneto-optical effect of thin films and its application, research on applied technology of plasma physics, synchrotron radiation light source, Hall effect family, etc., and lectures on light field regulation in micro nanostructures, international frontier research progress in intelligent holographic photonics, overview of space plasma, fundamentals and applications of spintronics, etc.

This summer School International program will help students master the discipline dynamics in the field of physics, realize the importance of physics to social development, enhance the interest in further scientific research, and broaden international horizons. With English teaching, students can master the basic English terms in the field of physics, and

get immersive content-based English learning opportunities while learning basic knowledge. Meanwhile, we will organize and arrange rich and colorful extracurricular teaching to make this summer school brilliant, colorful and fruitful.

About Faculties

1. Mikhail Ye. Zhuravlev, Ph. D

Professor in the National University of St. Petersburg, Russia. He has been engaged in the research of quantum mechanical transport theory and magnetic theory for a long time. In the past few years, he has made a series of breakthrough research work in the fields of ferroelectric tunnel junction tunneling resistance effect, magnetic tunnel junction tunneling magnetoresistance effect, Hall effect of nanosystems and magnetic theory, and has won unanimous recognition and high praise from the academic community.

2. Anatoly V. Vedyayev, Ph. D

Professor at the Department of physics of Moscow University, director of the Department of magnetism of the Department of physics from 1986 to 2013. He has been engaged in the theoretical research of spintronics for a long time, and has made a series of breakthroughs in the fields of spin Hall effect, spin accumulation, spin orbital torque and magnetization dynamics of nanosystem.

3. Anatoly Kudryavtsev, Ph. D

Expert in gas discharge and plasma applications, professor at the Department of physics of the National University of St. Petersburg, Russia, head of the Russian side of the "Sino Russian Joint Research Center for plasma physics application technology", and has long-term cooperation with our university in plasma physics research.

4. Vladimir Demidov, Ph. D

Professor of St. Petersburg National University and West Virginia University, he has long been engaged in plasma physical chemistry and plasma system research, and has rich research experience in gas discharge, plasma electronic equipment, complex plasma, plasma electromagnetic interaction, plasma diagnosis, etc.

5. Vladimir L. Bychkov, Ph. D

Chief scientist of Moscow State University, president of the Russian spherical discharge Association, vice president of the international spherical discharge Association, academician of the Russian Academy of natural sciences.

6. Ismail Rafatov, Ph. D

Professor in the Middle East University of technology, he has been engaged in plasma numerical simulation.

7. Chong Kim ONG, Ph. D

Professor at the Department of physics in the National University of Singapore, Chairman of the Singapore Institute of physics from 1996 to 2000, he won the highest-level outstanding research award from the National University of Singapore in 2010, and served as the first vice chairman of the Singapore Academy of Sciences from 1998 to 2000. he has been engaged in High k dielectric materials, tunable dielectric and microwave devices, left-handed materials, microwave helical filters, high-temperature superconductor devices, high-frequency magnetic films, etc.

8. Shibo Xi, Ph. D

Researcher at the National University of Singapore, participated in the construction of Beijing Synchrotron Radiation Facility (BSRF) 4B7B experimental station, upgraded 3W1B experimental station, and developed the fast scan mode of XAFCA after joining Singapore light source.

9. Xiaogang Wang, Ph. D

Professor at the School of physics, Harbin Institute of technology, chief scientist of space plasma environment simulation research system of National University of science and Engineering Headquarters, member of the National Expert Committee on magnetic confinement fusion, director of the plasma physics branch of the Chinese physical society, APS fellow; He has been engaged in plasma physics and made internationally influential research achievements in the magnetic reconnection of fusion and space plasma physics.

10. Qinghai Song, Ph. D

Professor in Harbin Institute of Technology (Shenzhen), selected into the youth talent plan of the Organization In 2012, department of the CPC Central Committee, selected as a national outstanding youth in 2020, he was. The main research direction is micro and nano scale light field regulation.

10. Liangcai Cao, Ph. D

Professor and director of the Institute of Optoelectronic Engineering of Tsinghua University. The main research fields are holography and information optics.

Requirements

Graduate students in sophomores and above, undergraduates who have general physics foundations from foreign universities will be accepted. Students must have strong English listening and speaking skills since all courses will be given in English.

Schedule of Curriculum

Class Schedule

Name of Course	Credit hours	Credits	Test Form
Magneto-optic effect of thin films and its application	8	0.5	Paper
Hall effect family	8	0.5	Paper
Synchrotron radiation light source	8	0.5	Paper
Research on applied technology of plasma physics	8	0.5	Paper
Introduction to plasma physics	8	0.5	Paper
Lectures on frontier reports in Physics	32	2	Paper

Extracurricular Teaching

Program Name	Content
IYPT subject research	Students sign up voluntarily, with 3-4 people in each group, equipped with a guidance team of professors in the schools of physics
Online tour	Online visit the big science device "space environment ground simulation system" through live or video broadcast

2022 Physics and Future Technological Change Class Schedule

Date	Time	Class Name	Lecturer
August 1 (Mon)	13:30-14:00	Opening Ceremony	Leader of the school of Physics
	14:00-16:30	Magneto-optic effect of thin films and its application	Prof. Mikhail Ye. Zhuravlev
	18:00-20:30	Magneto-optic effect of thin films and its application	Prof. Mikhail Ye. Zhuravlev
August 2 (Tue)	14:00-16:30	Introduction to plasma physics	Prof. Anatoly Kudryavtsev
	18:00-20:30	Introduction to plasma physics	Prof. Anatoly Kudryavtsev
August 3 (Wed)	14:00-16:30	Hall effect family	Prof. Anatoly V. Vedyaye
	18:00-20:30	Hall effect family	Prof. Anatoly V. Vedyaye
August 4 (Thu)	14:00-16:30	Research on applied technology of plasma physics	Prof. Vladimir Demidov
	18:00-20:30	Research on applied technology of plasma physics	Prof. Vladimir Demidov
August 5 (Fri)	14:00-16:30	Synchrotron radiation light source	Researcher Shibo Xi
	18:00-20:30	Synchrotron radiation light source	Researcher Shibo Xi
August 6 (Sat)	14:00-16:30	High temperature superconducting microwave device	Prof. Chong Kim ONG
	18:00-20:30	Advances in numerical simulation of plasma physics	Prof. Ismail Rafatov
August 7 (Sun)	13:30-15:00	Overview of space plasma	Prof. Xiaogang Wang
	15:10-16:40	Intelligent holographic Photonics	Prof. Liangcai Cao
	18:00-20:30	Overview of plasma generation technology	Prof. Vladimir Bychkov

August 8 (Mon)	13:30-15:00	Advances in low temperature plasma physics and Application Technology	Prof. Qiuyue Nie
	15:10-16:40	Light field regulation in micro nano structure	Prof. Qinghai Song
	17:30-19:00	Nanosecond Plasma: Basic Physics and Applications	Assistant Prof. Stepan Eliseev
	19:10-20:40	Plasma physical model	Associate prof. Evgeny Bogdanov
August 9 (Tue)	13:30-15:00	Spintronics fundamentals and applications	Prof. Lingling Tao
	15:10-16:40	Influence of a magnetic field on the properties of a gas discharge and applications	Assistant Prof. Kurban Rabadanov
	17:30-19:00	Microwave methods for studying gas discharge plasma	Prof. Alexander Astafiev
	19:10-20:40	Application of high power microwave pulse compression system in science	Prof. Vladislav Igumnov

Remarks: Time for extracurricular teachings are arranged in August 10 to August 14 according to the actual registration situation.