China’s Postgraduate Education in Astronomy

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Abstract: This paper summarises the opportunities available for postgraduate education in astronomy and related disciplines in China.

1. Introduction
China has four universities (Nanjing University, The University of Science and Technology of China, Beijing University and Beijing Normal University) and five Observatories (Beijing Observatory, Purple Mountain Observatory, Shanghai Observatory, Yunnan Observatory and Shanxi Observatory) to produce specialist graduate students of astrophysics, astrometry and celestial mechanics. After passing a series of examinations, about 40 candidates for the Master’s degree and 20 PhD candidates enrol each year. Recently, postdoctoral mobile stations have been established at Nanjing University, The University of Science and Technology of China and Beijing Observatory to let some bright recent PhD graduates further develop their research ability. Higher degree graduates (including some awarded degrees from foreign countries) usually get positions in observatories, research institutes or universities to do teaching and research.

2. The Source of Graduate Students
Higher degree candidates are selected from graduates majoring in astronomy, physics, mathematics and related subjects, and from teaching assistants and research assistants working in related fields. After being recommended by scholars of high reputation and passing qualifying examinations, a candidate must be re-examined orally to help supervisors get to know him well and to make arrangements for further study.

3. Duration and Main Courses of Postgraduate Study
The duration of postgraduate study is two to three years for a Master’s degree and an additional three years for a doctoral degree. Each candidate for the Master’s degree spends about one to two years doing course work and one year in thesis work, while a PhD candidate usually needs to do one year’s course work and spends the rest of the time doing his research work. Some PhD candidates carry out two years research overseas under collaborative programs which have been established with the United States of America, The Federal Republic of Germany, Italy and other countries.

There are two main areas for postgraduate study: Astrophysics and Astronomy, and Celestial Mechanics. Each consists of several research fields. At Nanjing University the available research fields and main courses for postgraduate study are as follows.

(a) Master’s degree
- Research field: High Energy Astrophysics
  - Main courses:
    - Radiation Theory in Astrophysics
    - Plasma Astrophysics
    - Advanced Quantum Mechanics
    - Physics of Galaxies and Active Galaxies
    - Modern Astrophysics

- Research field: Physics of Solar Active Regions
  - Main courses:
    - Radiation Theory in Astrophysics
    - Plasma Astrophysics
    - Physics of Solar Active Regions
    - Radiative Hydrodynamics

- Research field: Astronomical Reference Systems
  - Main courses:
    - Earth Rotation
    - Advanced Spherical Astronomy
    - Vectorial Astronomy
    - Dynamics of Earth Rotation
    - Astrometry with VLBI

- Research field: Non-linear Celestial Mechanics
  - Main courses:
    - Theory of Motion of Three-body Problems
    - Non-linear Celestial Mechanics
    - Theory of Orbits
    - Real and Complex Analysis
    - Calculus of Manifolds

(b) Doctoral degree
- Research field: High Energy Astrophysics
  - Main courses:
    - Physical Processes in the Interstellar Medium
    - Astrophysical Blast Waves

- Research field: Neutron Stars and Cosmology
  - Main courses:
    - Neutron Stars and their High Energy Phenomena
    - Structure and Evolution of the Universe

- Research field: Physics of Solar Active Regions
  - Main courses:
    - Flare Dynamics
    - Methods of Numerical Calculation for Partial Differential Equations

- Research field: Astronomical Reference Systems
  - Main courses:
    - Theory of Reference Systems
    - Relativistic Astrometry and Celestial Mechanics

- Research field: Relativistic Celestial Mechanics
  - Main courses:
    - Relativistic Astrometry and Celestial Mechanics
    - Relativistic Stellar Dynamics

- Research field: Non-linear Celestial Mechanics
  - Main courses:
    - Regular and Stochastic Motion
    - Mathematical Methods of Classical Mechanics
• Research field: Theory of Motions of Minor Natural and Artificial Bodies in the Solar System
  Main courses:
  Mathematical Methods of Classical Mechanics
  Estimation Theory
  The Orbital Theory of Artificial Satellites

In addition, postgraduate students are encouraged to attend seminars and scientific conferences to broaden their knowledge.

4. Further Plans
In China we aim to
• strengthen elementary knowledge, broaden this knowledge, and encourage postgraduate students to undertake special studies related to their selected courses.
• strive for more extensive exchange and more collaboration with other countries so that students can learn the developing trends of their specialities and acquire the latest information as quickly as possible.