

Overview of PhD training in astronomy at Uppsala University

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Outline

- Organization of PhD program
- Funding, advertising and recruitment
- Employment conditions
- Individual study plan
- Courses
- Research training
- Follow up
- After PhD
- Conclusions

Organization of PhD program

- Faculty of Science and Technology:
 - Develops general regulations and guidelines, approves description of PhD programs, appoints professors responsible for PhD programs, approves faculty opponents and thesis defence committees
- Department of Physics and Astronomy:
 - Approves recruitment and employment, addresses major problems and conflicts
 - Information exchange and synergy between different physics PhD programs
 - Administrative support
- Division of Astronomy and Space Physics:
 - Program-responsible professors + college of supervisors (postdoc and above)
 - Opening positions, recruiting PhD students, monitoring their progress
 - Content of PhD program, training, courses, ...
 - Suggests opponents and committees for thesis defences

Funding, advertising and recruitment

- Mix of external (common) and internal (rare) funding. Funding for the entire duration have to be secured/agreed to advertise a PhD position. Full cost over 4 yrs: 310 kEuro
- Position announcements specify research project/supervisor (external funding) or list several research areas (internal faculty funding)
- Positions are advertised internationally for 1-3 months prior to deadline. Posted at university job webpages, AAS, mailing lists, ...
- 50-150 applicants. Require at least 4 years of university studies with master degree or equivalent in physics or astronomy. Diverse geographical and educational backgrounds. Good gender balance (currently 3 male, 5 female)
- Committee of 3-4 astronomy division/department members derives a shortlist and interviews about 5 candidates. For externally funded positions, PI has the final saying

Employment conditions

- 4 years of full-time studies. Can be extended by up to 1 yr to compensate work for the division or department (teaching, outreach, project management)
- Part-time PhD studies are allowed but not practiced in astronomy. Interruptions (ESO, ESA, NOT studentships) are possible
- Main supervisor + one or two co-supervisors. Right to change supervisors/project. No automatic compensation for eventual time losses
- Temporary contract employment. Standard benefits (healthcare, parental leave, pension, paid vacation). Salary is the same for every student, set by university. Salary increases annually and after reaching 50% and 80% of full-time studies
- Salary and minimal travel budget (2-3 travels per year) is guaranteed. Students are encouraged to apply for stipends to fund more travel and small equipment

Individual study plan

- The only formal document monitoring employment and study progress of individual students. Filled in jointly by the student and supervisors
- Updated at least once a year. Signed by the student, supervisors. Approved by the professor responsible for PhD program. Archived by the department
- Describes the overall PhD project and specific sub-projects. Gives time line for important steps (completion of papers, licentiate thesis, PhD thesis)
- Lists completed and planned
 - Elapsed time in PhD studies
 - Work for the department (no more than 20% FTE)
 - Research projects, papers, courses
 - Schools, conferences, research trips, presentations
 - Learning goals
- Reflects on the quantity and quality of supervision. Discusses problems

Courses

- PhD education includes courses for 60 credits (=1 year of full-time studies)
- List of courses is determined individually for each student. Regularly updated and tracked with ISP. There are no* compulsory courses
- Faculty/department-level courses: introduction to PhD studies, research ethics*, scientific writing, statistics, programming, pedagogy, exit from PhD studies
- Astronomy division master courses (regular): cosmology, galaxies, stellar and planetary physics, theoretical and observational astrophysics
- Astronomy division PhD courses (irregular): radiation hydrodynamics, inverse problems, stellar magnetic fields
- Individual courses: self-study courses, winter/summer schools

Research training

- Main goals (occasionally conflicting)
 - Train a skilful, independent researcher in astronomy
 - Reach scientific and/or technical goals in the project that has funded the student
- PhD training is focused on completing specific research projects and writing peer-reviewed papers in top international astronomy and/or physics journals
- Great variety of specific PhD projects
 - Theoretical astrophysics: producing and interpreting numerical simulations, applications of atomic physics in astrophysical problems
 - Observational astronomy: building instruments, developing data processing and analysis software, participating in large surveys, preparation to and data analysis for space missions (Gaia, PLATO), doing observations, interpreting archival data
 - Various combinations thereof
- PhD thesis is a collection of papers by the student (2-5 as first author) + a short introduction. Licentiate thesis can be re-used as part of PhD thesis

Follow up

- Assessed by program-responsible professor + supervisor college
 - Joint student + supervisor 4-month seminar to present thesis project
 - Mid-term seminar or licentiate thesis defence
 - Seminar 6 months before PhD thesis defence
 - Occasional (~once a year) short presentation at division meetings
 - Follow-up discussion of student's progress at bi-annual supervisors' meetings
 - Assessed by external opponent and committee
 - Licentiate thesis defence
 - PhD thesis defence
 - No formal examinations that could result in discontinuation of PhD studies
- } compulsory
- optional

Careers after getting PhD

- In astronomy it is rare to continue being employed at Uppsala University (or other Swedish university) after getting a PhD degree
- We encourage PhD students to apply for postdoctoral positions abroad and we provide information where and how to apply
- Some statistics based on 41 graduates (compiled by A. Amarsi)
 - Did a first postdoc: 26 (63.4%)
 - Still in astro: 13 (31.7%)
 - Doing some kind of research: 29 (70.7%)
 - Now in Sweden: 33 (80.5%)
 - Working at public/research institute: 26 (63.4%)
 - Largest employer – department of defence (FOI): 8 (19.5%)

Conclusions

- What works well and makes us proud
 - International, talented, diverse pool of PhD students
 - Friendly, collegial atmosphere at the division
 - Highly individualised, flexible approach to PhD courses and research training
- What is currently problematic and can be improved (personal view)
 - High cost of PhD student employment
 - Retention of PhD graduates in academia
 - Lack of local PhD-level courses in astronomy
 - Lack of hands-on observing experience (is this still part of being an astronomer?)
 - Lack of training in defending one's viewpoint, giving and receiving criticism