Netherlands:6 PhD candidates in Mathematics

The Korteweg-de Vries Instituut voor Wiskunde (KdV Institute) is the mathematical research institute of the Faculty of Science of the Universiteit van Amsterdam. The KdV Institute offers a stimulating scientific environment in which research focuses mainly within the research programmes:

Algebra, Geometry and Mathematical Physics;
Pure, Applied and Numerical Analysis, and
Stochastics.

It also provides the lecturers and instructors for the mathematics teaching within the Science faculty. The KdV Institute participates in the NWO research clusters GQT, STAR, NDNS+ and DIAMANT and in the Gravity programme NETWORKS. There is formal (and informal) cooperation with the Centrum Wiskunde & Informatica (CWI), the VU University, and with Eurandom in Eindhoven. KdVI counts about 30 staff members and 40 postdocs and PhD students.

Project descriptions

Project 1: Frobenius manifolds and integrable systems

The general topic will involve a number of questions in geometry and mathematical physics coming from the theory of Frobenius manifolds and integrable systems, and their interactions with cohomological field theory, combinatorics, geometry of moduli spaces. More specific topics which will be covered are: relations between Gromov-Witten type invariants and integrable hierarchies; Hamiltonian structures for integrable hierarchies and their deformation theory; infinite dimensional Frobenius manifold theory and integrable hierarchies in higher number of spatial variables; interaction of the Givental group action and the explicit formulation of tau-symmetric integrable hierarchies, in particular their quadratic Hirota equations. Affinity with mathematical physics is a plus.

The student is expected to spend roughly half of the time in Amsterdam and half in Dijon.

Supervisors: Prof. Sergey Shadrin (Universiteit van Amsterdam) and Prof. Guido Carlet (Université de Bourgogne).

Project 2: Lie Algebroids and deformation quantization

Project 2 centers around the theory of Lie algebroids. Lie algebroids are certain geometric objects encoding symmetries, and occur in a wide variety of situations. As such, they can be studied from many different points of view, bringing together techniques from differential/algebraic geometry, representation theory and noncommutative geometry. The aim of this project is to compare these different approaches in the study of representations of Lie algebroids and use the setting of Lie algebroids to explore recent new ideas in the theory of deformation quantization, making a connection to the theory of Frobenius manifolds.

Supervisor: Dr Hessel Posthuma

Project 3: Frobenius manifolds and their relation to homological mirror symmetry

The research topic will be Frobenius manifolds and their relation to homological mirror symmetry. In particular, the candidate will investigate how Frobenius manifolds appear both in the deformation theory and the theory of stability conditions of categories that come from mirror symmetry and tie this to singularity theory and the theory of Riemann surfaces.

Supervisor: Dr Raf Bocklandt.

Project 4: Infinite-dimensional affine and polynomial preserving processes

This project concerns infinite-dimensional SDEs and their practical applications in financial markets. Topics of interest include stochastic partial differential equations, weak approximation, affine stochastic processes, pricing options, energy derivatives, and hedging approaches.
Applicants should have a strong background in analysis and/or probability theory. Ideally speaking the candidate has written an MSc thesis on a topic in stochastic analysis. Furthermore, a profound interest to combine theory with practical applications is expected.

Supervisors: Dr Asma Khedher and Dr Sonja Cox.

Project 5: Zeta functions of the Newton strata of Shimura varieties

The Langlands-Kottwitz method has been developed in order to computer the cohomology of Shimura varieties and to construct many of the Galois representations predicted by the Langlands program. In this project we propose to adapt the Langlands-Kottwitz method to compute the cohomology of Newton strata of Shimura varieties.

Background in algebraic geometry and number theory is required.

Supervisor: Dr Arno Kret.

Project 6: Harmonic analysis on affine symmetric pairs and boundary correlation functions

This project is at the interface of representation theory and theoretical physics. It aims to describe correlation functions for integrable quantum field theories with boundaries using representation theory of quantum affine Lie algebras. Affinity with theoretical physics is a plus.

Supervisors: Prof. Jasper Stokman and Prof. Nicolai Reshetikhin.

The starting date of project is no later than 1 September 2018

Requirements

Master degree in Mathematics or related field;
highly motivated;
fluent in English, both written and spoken.

Experience in teaching is a plus.

Further information

For additional information please contact:

Dr M. Kranenburg

Appointment

The appointment will be on a temporary basis for a period of 4 years (initial appointment will be for a period of 18 months and after satisfactory evaluation it can be extended for a total duration of 4 years) and should lead to a dissertation (PhD thesis). An educational plan will be drafted that includes attendance of courses and (international) meetings. The PhD candidate is also expected to assist in teaching of undergraduates.

Based on a full-time appointment (38 hours per week) the gross monthly salary will range from □□□□□□ in the first year to €2,840 in the last year. The Collective Labour Agreement for Dutch Universities is applicable.

Job application

You may submit your application to application-science@uva.nl .

You may apply to either one or more projects. When applying for one of the projects, please mention the project of interest. When applying for more projects, please indicate a ranked list of the top-3 of projects you would like to work on and why.

Applications must include the following:

motivation letter explaining why you are the right candidate;
curriculum vitae, (max 3 pages);
copy of your Master's thesis (when available). If not yet available, please include a copy of your Bachelor's thesis.
complete record of Bachelor and Master courses (including grades);
the names and contact addresses of at least two academic references.

All these should be grouped in one PDF attachment.

The Committee does not guarantee that late or incomplete applications will be considered.We will not process applications not mentioning vacancy number 18-062 and the title of the project you

are applying for in the subject-line.

Tentative Submission Deadline : 31 March 2018

Further Information