

## PhD in **Classical and Quantum Integrable Systems**

Potential supervisors include: Dr Clare Dunning, Professor Andy Hone, Dr Steffen Krusch, Dr Ana Loureiro, Professor Jing Ping Wang

The concept of 'completely integrable system' arose in the 19th century in the context of finite-dimensional classical mechanics. According to Liouville's Theorem, a Hamiltonian system of  $n$  degrees of freedom with  $n$  Poisson commuting independent first integrals is completely integrable. By analogy, a quantum integrable system is the one with  $n$  commuting operators.

Nowadays we study integrable systems of many shapes or forms: nonlinear evolution equations, partial and ordinary differential equations and difference equations, quantum systems and maps. A large number of mathematical techniques have been developed to unravel the rich structures behind them. Integrable systems have also led to the development of interesting new mathematics ranging from differential geometry and complex analysis to quantum field theory.

At Kent there are a wide range of research activities in integrable nonlinear systems:

- Integrability conditions & hidden structures of integrable systems such as recursion operators and Hamiltonian structures;
- Discrete and/or nonabelian integrable systems;
- Exact solutions of integrable systems;
- Quantum integrable systems and statistical mechanics;
- Applications of integrable systems in mathematical physics;
- Interactions with the theory of orthogonal polynomials and other special functions.

You can find more details about our group and its research expertise on our research webpage:

<https://research.kent.ac.uk/mathematics/research/mathematical-physics-and-nonlinear-systems/>

The group has a dedicated weekly seminar and coordinates two Joint Research Groups in the UK funded by the London Mathematical Society: *South East Mathematical Physics Seminars* and *Orthogonal Polynomials, Special Functions, Operator Theory and Applications* (currently running online with International Centre for Mathematical Sciences).

General information on the application process can be found on the following webpage:

<https://www.kent.ac.uk/smsas/postgraduate/phd-applications.html>

We welcome applications from all interested candidates and if you have any questions, feel free to contact us.