

## ADVANCED GRADUATE LECTURE SERIES

### Cluster algebras and discrete integrable systems

**Prof. Andrew Hone**

**(U of Kent)**

The ESI is pleased to announce 4 two-hour lectures by Andrew Hone:

**January 20, 22, 26 and 27, 2015 at 2:15 p.m..**

**Venue: ESI, Schrödinger Lecture Hall**

The purpose of these lectures is to give a brief introduction to cluster algebras, and explain some of the connections with discrete integrable systems. The following is a rough outline of the particular topics to be covered:

1. Background and examples of cluster algebras: Somos sequences in number theory; Laurent property; Abel pentagon identity, Lyness map and the dilogarithm; Zamolodchikov Y-systems; Plucker coordinates in Grassmannians; discrete Hirota equations.
2. Cluster algebras without coefficients: quivers and quiver mutation; exchange matrices and matrix mutation; cluster variables and cluster mutation.
3. Poisson and symplectic structures: Poisson brackets; symplectic forms; Gekhtman-Shapiro-Vainshtein Poisson structure for cluster algebras; examples of noninvariant symplectic leaves; compatible presymplectic forms and reduction to symplectic coordinates.
4. Cluster mutation-periodicity: Mutation-periodic quivers; Fordy & Marsh classification of period 1 and recurrence relations; primitives and affine Dynkin diagrams; Dodgson condensation; linear relations for cluster variables.
5. Tropical relations and algebraic entropy: Growth of denominators; max-plus tropical algebra; dynamics of tropical maps; algebraic entropy; experimental classification.
6. Discrete integrable systems: Affine A-type cluster algebras and dressing chain - monodromy matrix and Lenard-Magri chain; discrete Hirota and reduction to Somos/Gale-Robinson; connection with QRT maps.

For further details please visit the ESI Website (<http://www.esi.ac.at/activities/events/2015/integrable-systems>)

Joachim Schwermer  
Director