Proposed Project Work

Recently, in joint work by Damianou and Fernandes, a connection between integrable hierarchies and the so-called modular class of a Poisson manifold was established.

We recall that the modular class is a Poisson cohomology class, which is the obstruction to the existence of a measure invariant under all hamiltonian flows. This notion extends to any Lie algebroid, and there is a relative modular class associated with a morphism of Lie algebroids. As was shown first by Magri and Kosmann-Schwarzbach, Poisson-Nijenhuis manifolds give the appropriate setting to study integrable hierarchies. The work of Damianou and Fernandes shows that to any non-degenerate Poisson-Nijenhuis manifold one can associate a canonical integrable hierarchy, which is intimately connected with the relative modular class of the Poisson-Nijenhuis tensor.

The purpose of this project is to explore further the connections between modular classes and integrable hierarchies, its relationship to algebraic integrability and to separability, including such topics as Poisson cohomology, and its invariant and equivariant versions. It will involve the applicant, who is a specialist in Poisson geometry, local researchers Marco Pedroni and Gregorio Falqui, who are specialists in integrable hierarchies and separability, and Pol Vanhaecke (Poitiers) who will also be visiting during the same period, and who is a specialist in algebraic integrability.