

## Application for a short visit MISGAM grant

### Short description of the proposed project *Affine Polynomial Lie Algebras*

Kac and Peterson showed in 1985 that there are many different realizations of the same level one module for affine Lie algebras. For the Lie algebra of type  $A_{K-1}^{(1)}$  there exists one such a realizations for every partition

$$K = K_1 + K_2 + \cdots + K_n$$

of  $K$ .

These realizations, also for other type of Lie algebras, were explicitly constructed in a series of 4 papers by ten Kroode and van de Leur (Years 1991-93).

To each such realization one can associate a hierarchy of soliton equations. For type  $A_{K-1}^{(1)}$  lie algebras these hierarchies can e.g. be obtained as a reduction of the  $n$ -component KP hierarchy. Here  $n$  is the number of parts in the partition of  $K$ . The aim of the short visit is to start a joined research with Ortenzi and Casati, in which we want to try to generalize all above constructions to the framework of Polynomial Lie Algebras. These Lie algebras were introduced by them in their recent paper "New Integrable Hierarchies from Vertex Operator Representations of Polynomial Lie Algebras" in Journal of Geometry and Physics.

To start this research I want to visit Università degli Studi di Milano-Bicocca from November 6 - November 11 2006. My host will be Prof. Franco Magri.