

Report on the 1 month exchange visit of Prof. Giuseppe Mussardo at the Department de Physique Theorique de l'Ecole Normale Supérieure de Lyon

The purpose of the visit was to strength the collaboration with the group of Prof. J.M. Maillet on the problem of correlation functions in quantum field theories and statistical mechanics. The visit has been extremely useful and successful. During this period, I worked on two projects:

- 1) the correlation functions of 1-D Lieb Liniger model in the attractive regime. This model is important for understanding the dynamics of ultracold boson gas and, for this reason, it has recently attracted the attention of many groups. I have developed a numerical code on the Bethe ansatz equation for the excitations of this model and I have also underlined its close analogy with the relativistic Sine (Sinh)-Gordon Bethe ansatz equation. The complete control of the dynamics of the relativistic models may be the key to compute the correlation functions of the Lieb-Liniger gas. This project will be completed within the next months. It has been extremely useful to discuss the main issues of this project with J.M. Maillet and his closest collaborators (N. Slavnov and J.S. Caux).
- 2) The second project concerns the spectrum of the neutral particles for non-integrable field theories with kink-like excitations. This is important for understanding the statistical mechanics of theories with several vacua, not necessarily related by a symmetry. I am presently completing a long paper on this subject, with the following new results: (a) nature of the semiclassical kink solution and their asymptotic expressions; (b) general law for the mass spectrum of the neutral bound state; (c) maximum number of neutral particles supported by each vacuum state (at most 2); (d) the importance of the ordering of the kink-antikink state for having a bound state; (e) Double Sine-Gordon wells done doubly well; (f) estimate of the decay rates of the unstable particles.

Collaboration with the host institute is expected to continue in the future on the above topics of quantum field theories.

Further comments: my travel from Trieste to Lyon and viceversa was done by car. The price of a APEX airfare is around 461 Euro (Carrier Lufthansa, web-page : <http://www.lufthansa.com/>).