

Report for Paul Fendley visit to SISSA
February 17-21, 2008

I visited SISSA, Trieste, in order to initiate several collaborations with Giuseppe Mussardo.

The original plan was to understand how some old work of mine on the BPS spectrum of supersymmetric field theories in two dimensions relates to recent work of Mussardo's on using the form factor approach to the same problem. We, along with two of his graduate students, discussed this in detail. It became clear from these discussions that this the two approaches will mesh perfectly. From the old work we know that the mass spectrum follows directly from the superpotential, so the first thing to do is relate the form-factor computations to the superpotential. This is straightforward, and can be done by the students. Following this, it should be possible to use the differential equations in the old work to compute the form factors. If this works, we will then have a novel way of understanding form factors, and open up a whole new area.

As a result of our discussions, several new ideas emerged. One is to use Mussardo's form-factor perturbation theory to study the quantum spin-1 chain in its Haldane phase. In particular, one should be able to understand this phase by perturbing around the solvable $SU(2)_2$ point, and hopefully shed more light on the order parameter of den Nijs and Rommelse, perhaps even understanding how to extend their work from the lattice to the continuum field theory.

In addition, Mussardo has become quite interested in topological quantum computation and its connection to conformal field theory. Thus I spent a while explaining recent work I had done with Fisher and Nayak to him and a (different) graduate student, and I hope we will be able to push these ideas further.