

# SPECIAL MATHEMATICS COLLOQUIUM

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*"Measures on Banach manifolds and  
supersymmetric quantum field theory"*

Wednesday, May 7, 2008  
4:30-5:20pm, tea time @ 4:10 in faculty Lounge  
Surge 268

We show how to construct measures on Banach manifolds associated to supersymmetric quantum field theories. We give three concrete examples of our construction. The first example is a family  $\mu_P^{S,T}$  of measures on a space of functions on the two-torus, parametrized by a polynomial  $p$  (the Wess-Zumino-Landau-Ginzburg model). The second is a family  $\mu_{cG}^{s,t}$  of measures on a space  $cG$  of maps from  $p^1$  to a Lie group (the Wess-Zumino-Novikov-Witten model).

Finally we study a family  $\mu_{[M,G]}^{s,t}$  of measures on the product of a space of connections on the trivial principal bundle with structure group  $G$  on a three-dimensional manifold  $M$  with a space of  $\mathbb{R}$ -valued three-forms on  $M$ . We show that these measures are positive, and that the measures  $\mu_{cG}^{s,t}$  are borel probability measures. As an application we show that formulas arising from Expectations in the measures  $\mu_{cG}^{s,1}$  reproduce formulas discovered by Frenkel and Zhu in the theory of Vertex operator algebras. We conjecture that a similar Computation for the measures  $\mu_{[M, SU(2)]}^{s,t}$ , where  $M$  is a homology three-sphere, will yield the Casson invariant of  $m$ .