Critical points of Green functions and the mean field equations on tori.

王金龍
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The two dimensional non-linear mean field equation is closely related to the prescribed curvature problem as well as the self-dual condensation of the Chern-Simons-Higgs model. However, even on a flat torus, its solvability depends on the geometry in a non-trivial manner. In this talk I shall report on a recent joint work with C.-S. Lin where we show that the number of critical points of the Green function is exactly the geometric invariant to detect the existence and uniqueness of the mean field equation. We also discuss the geometry of the critical points when the tori vary in the moduli space. The main techniques we develop are the symmetrization method with delta singularities and the functional equations of theta functions.

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Harmonic Forms on Complete Manifolds

宋瓊珠
中正大學

In this talk, We will explain some recent results concerning the estimate of the dimensions of various spaces of harmonic forms. We proved that the dimension of such spaces must be finite and can be estimated if the metric is uniformly equivalent to one with asymptotically nonnegative curvature operator.

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Complete hyperbolic Stein manifolds with prescribed automorphism groups

康素珍
中央研究院

It is well-known that the automorphism group of a hyperbolic manifold is a Lie group. Conversely, it is interesting to see whether or not any Lie group can be prescribed as the automorphism group of certain complex manifold.

We prove that for any connected Lie group G (compact or noncompact), there exist complete hyperbolic Stein manifolds Ω such that $Aut(\Omega)=G$ with $dim_{\Bbb C}\Omega=dim_{\Bbb R}G.$ Working on a natural complexification of the real-analytic manifold G, our construction of Ω is geometrically concrete and elementary in nature.

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Characterizating projective spaces for varieties with at worst quotient singularities

陳俊成
西北大學

I will talk about my recent result on characterzing projective spaces for possiblly singular varieties. The well-known result by Cho-Miyaoka-Shepherd-Barron says that if X is smooth and projective of dimension n and the intersection number of the anti-canonical bundle with any curve is at least n+1 for any curves on X, then X is the n dimensional projective space. We generalize this result to varieties with at worst quotient singularities. The main methods are twisted stable maps and its deformation theory developed by H-H Tseng and myself. It time permits, I will also discuss futher generalizations of the methods.

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Invariance of big quantum ring under simple P^r-flops.

林惠雯
中央大學

For a 3 dimensional Atiyah flop, the cohomology correspondence induced from the graph gives rise to an isomorphism of cohomology groups but not the product structure. Li and Ruan had shown in 2001 that the quantum cohomology ring is indeed preserved up to an analytic continuation. The purpose of this talk to report on a recent joint work with Y.-P. Lee and C.-L. Wang on an extension of this result to all higher dimensional simple P^r-flops.

We show that the graph induces isomorphism of Chow motives and the quantum corrections attached to the extremal ray exactly remedy the defect casued by the ordinary cup product. The main problem in higher dimensions is to include cohomology classes into consideration. Thus besides the Euler data of Lian-Liu-Yau or Givental's J-function, we also need the reconstruction result due to Lee-Pandhariapande. We proceed to prove the full invariance by considering non-extremal curve classes . In dimension 3 this follows from the degenration formula and no analytic continuation is needed. However, in higher dimensions new phenomenon appears and our proof involves a systematic study of functional equations on n-point functions with descendent.

A subgradient estimate and Liouville theorems in a Pseudohermitian 3-manifol

邱鴻麟
中央研究院

In this talk. I will report on a joint paper with S.-C. Chang and C.-T. Wu. We first, based on a CR version of Bochner formula, get the integral version of Li-Yau subgradient estimate on a pseudohermitian 3-manifold. Then it is shown that the natural analogue of Liouville's theorem holds for the sub-Laplacian. Secondly, we get the CR version of Reilly's formula on a pseudohermitian 3-manifold with boundary,.As a consequence, we get a sharp lower bound of the positive first Dirichlet eigenvalue of the sub-Laplacian on a pseudohermitian 3-manifold with boundary of nonnagative p-mean curvature.