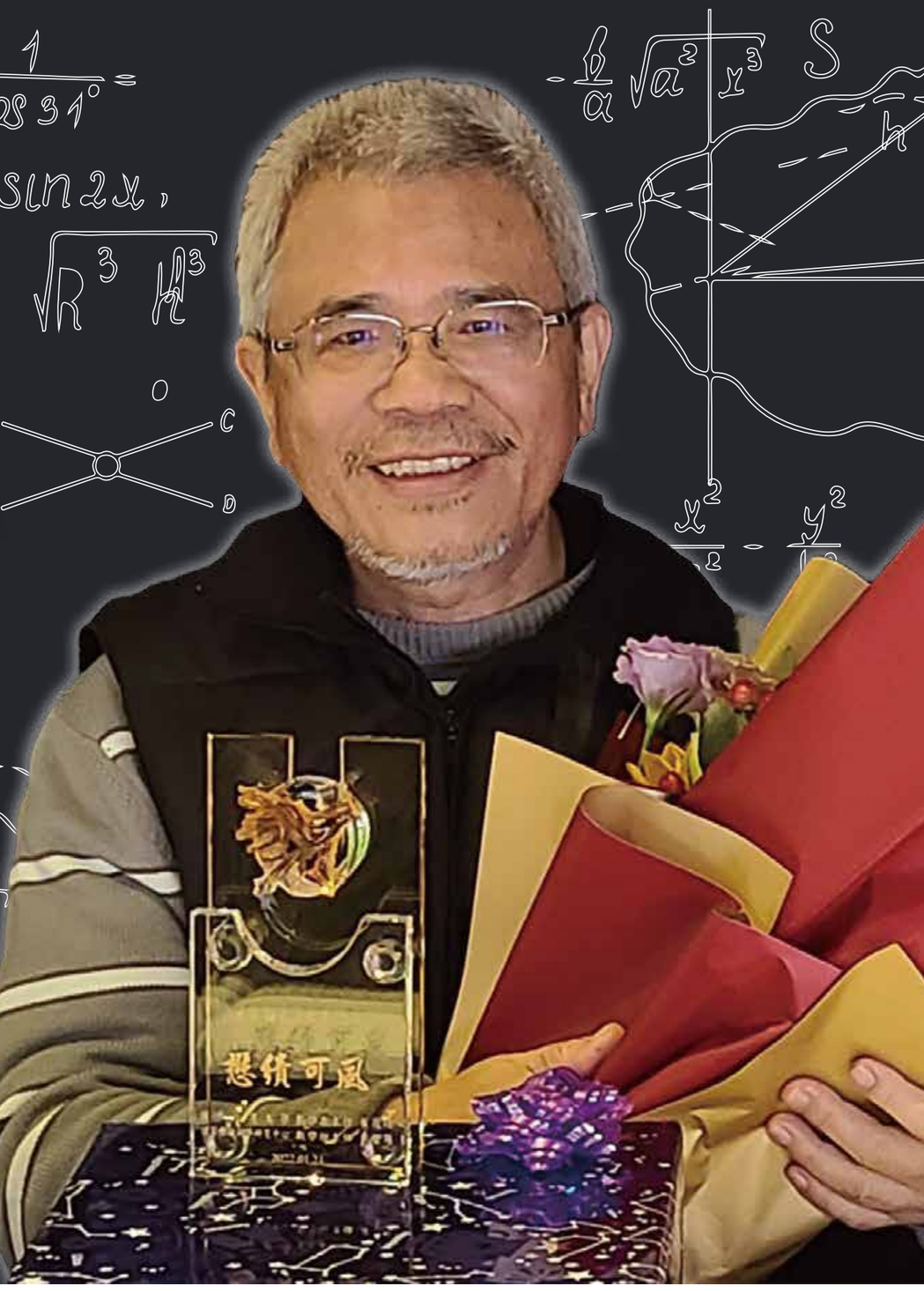
NCTS

National Center for Theoretical Sciences

Distinguished Lecture

Curvature Equation from the Aspect of Integrability



Speaker | **Chang Shou Lin** (National Taiwan University)

Date | **2022/07/11-07/12**

Venue | **R202, Astro.-Math Bldg.,NTU**

7/11-14:00-14:50 & 15:10-16:00 7/12-14:00-14:50

The curvature equation for finding conical spherical metrics in a conformal class of punctured Riemann surfaces is an integrable system. From analytic point of view, it is a special case of the so-called mean field equation in PDE theory. When the case is noncritical, there are some deep results concerning the bubbling phenomana. The simplest one among them is the existence of a priori bound, and equivalent to the properness of the forget map considered by a GAFA paper by Mondello-Panov. But the analytic works yield stronger results. We will discuss those results in the first lecture.

The integrability could associate the curvature equation with a second order Fuchsian ODE, and the existence of solution of the PDE is equivalent to that the monodromy group of the complex ODE is unitariable. For the second and third lecture, I will concentrate on the case when the surface is a flat torus and the equation contains only one singular point with the angle 2π $(2n+1)$, $n \in \mathbb{N}$. In this case, the associated ODE is an integral Lame equation, and a theory of premodular form has been developed by C.L. Wang and myself. One main result is any zero of premodular form is simple. This is proved by applying the Painleve sixth equation. Lame potentials is a KdV elliptic potential. We will also show how to apply this fact to obtain solution of some curvature equations, which flows from the Lame potential.

Contact |
Peggy Lee (peggylee@ncts.tw)

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