NEWGA Schedule and Title/Abstract

November 5, Saturday		**November 6, Sunday**	
9-9:10	Opening remark	9-9:50	**Guofang Wei** Fundamental Gap of Convex Domains in Space Forms and Surfaces
9:10-10	**Duong Phong** Geometric flows in symplectic geometry	10-10:30	*Tea and Coffee (2nd Floor Lounge)*
10:10-10:30	*Tea and Coffee (2nd Floor Lounge)*	10:30-11:20	**Felix Schulze** Initial stability estimates for Ricci flow and three dimensional Ricci-pinched manifolds
10:30-11:20	**Christina Sormani** Intrinsic Flat Convergence of Spaces arising in General Relativity	11:30-11:50	**Xin Dong** Bergman representative coordinate and constant holomorphic curvature
11:30-12:20	**Bo Guan** A more general class of fully nonlinear equations and some special metrics with prescribed volumes on Hermitian manifolds	12:00-12:20	**Freid Tong** A priori estimates for fully nonlinear equations in complex geometry
12:30-2:00	*Lunch Break*	12:30-2:00	*Lunch Break*
2:00-2:50	**Lydia Bieri** Classes of Spacetimes and Gravitational Radiation	2:00-2:20	**Gunhee Cho** Stochastic Schwarz lemma and Carathéodory metric on Kähler manifolds
3:00-3:50	**Martin Lesourd** Filling Manifolds with Positive Scalar Curvature	2:30-2:50	**Sven Hirsch** On a generalization of Geroch's conjecture
4:00-4:30	*Tea and Coffee (2nd Floor Lounge)*	3:00-3:20	**Tin Yau Tsang** Another perspective on Gromov's conjectures
4:30-5:20	**Yi Lai** O(2)-symmetry of 3D steady gradient Ricci solitons	3:30-4:00	*Social Hour (2nd Floor Lounge)*

Speakers	Title and Abstract
Duong H. Phong	Title: Geometric flows in symplectic geometry Abstract: The search for supersymmetric solutions of string theories has led to new geometric partial differential equations which are interesting in their own right. In particular, the Type IIA string leads to a new geometric flow, introduced by T. Fei, S. Picard, X.W. Zhang, and the speaker and called the Type IIA flow, which is a flow of closed and primitive 3-forms on a symplectic six-dimensional manifold. Remarkably, the Type IIA flow can also be viewed as a flow of a special class of almost-complex structures, so that almost-complex geometry turns out to be an efficient bridge between symplectic geometry and complex geometry. We survey what is now known about the Type IIA flow, with emphasis on the many open questions.
Christina Sormani	Title: Intrinsic Flat Convergence of Spaces arising in General Relativity Abstract: Intrinsic Flat Convergence is a notion of convergence of Riemannian manifolds which has been applied to study sequences of time symmetric asymptotically flat initial data sets whose ADM mass is converging to zero. It is useful in settings where there is no smooth convergence due to the existence of gravity wells and/or black holes. After quickly reviewing the above results, I will present joint work with Sakovich developing Spacetime Intrinsic Flat Convergence of Lorentzian manifolds using the null distance defined jointly with Vega and the Cosmological Time function of Andersson-Galloway-Howard.
Bo Guan	Title: A more general class of fully nonlinear equations and some special metrics with prescribed volumes on Hermitian manifolds Abstract. There have been increasing interests in fully nonlinear elliptic and parabolic equations from complex geometry. Most of these equations considered so far fall in the general framework established by Caffarelli-Nirenberg-Spruck; more precisely, they depend symmetrically on the eigenvalues of certain (1,1) forms with the complex Hessian of the perspective solution as the leading term. In this talk we consider some geometric problems which lead to equations outside this framework, and related extension of Calabi-Yau theorem for a class of Hermitian metrics of special properties. This talk is based on joint work with my student Mathew George.

Lydia Bieri	Title: Classes of Spacetimes and Gravitational Radiation Abstract: In Mathematical General Relativity (GR) the Einstein equations describe the laws of the universe. This system of hyperbolic nonlinear pde has served as a playground for all kinds of new problems and methods in geometric analysis. And progress in the latter enabled breakthrough results in GR in recent decades. A major goal in the study of these equations is to investigate the dynamics of the gravitational field. In particular, this includes gravitational waves and their sources. In this talk, we shall discuss recent results on various classes of asymptotically-flat spacetimes describing physical scenarios. We will explain new structures that emerge in the spacetime geometry and consequences for gravitational wave observations and the memory effects.
Martin Lesourd	Title: Filling Manifolds with Positive Scalar Curvature Abstract: I'll present Shi-Tam's inequality for the Brown-York mass and Pengzi Miao's PMT with corners, along with their generalizations to the arbitrary ends setting. I'll then describe how this leads to (non)existence results about positive scalar curvature fill-ins. This is based on joint work with Dan Lee and Ryan Unger.
Yi Lai	Title: O(2)-symmetry of 3D steady gradient Ricci solitons Abstract: For any 3D steady gradient Ricci soliton with positive curvature, if it is asymptotic to a ray we prove that it must be isometric to the Bryant soliton. Otherwise, it is asymptotic to a sector and called a flying wing. We show that all flying wings are O(2)-symmetric. Hence, all 3D steady gradient Ricci solitons are O(2)-symmetric.
Guofang Wei	Title: Fundamental Gap of Convex Domains in Space Forms and Surfaces Abstract: The fundamental gap is the difference of the first two eigenvalues of the Laplacian, which is important both in mathematics and physics. We will review many recent fantastic results for convex domains in R^n, S^n, H^n with Dirichlet boundary conditions. Then we will present a very recent estimate for the convex domain in surfaces with positive curvature. The last result is joint with G. Khan, H. Nguyen, M. Tuerkoen.

Felix Schulze	Title: Initial stability estimates for Ricci flow and three dimensional Ricci-pinched manifolds Abstract: We investigate the question of stability for a class of Ricci flows which start at possibly non-smooth metric spaces. We show that if the initial metric space is Reifenberg and locally bi-Lipschitz to Euclidean space, then two solutions to the Ricci flow whose Ricci curvature is uniformly bounded from below and whose curvature is bounded by ct^{-1} converge to one another at an exponential rate once they have been appropriately gauged. As an application, we show that smooth three dimensional, complete, uniformly Ricci-pinched Riemannian manifolds with bounded curvature are either compact or flat, thus confirming a conjecture of Hamilton and Lott. This is joint work with A. Deruelle and M. Simon.
Xin Dong	Title: Bergman representative coordinate and constant holomorphic curvature Abstract: With Bun Wong at UC Riverside, we study the Bergman representative coordinate and Calabi's diastasis on bounded pseudoconvex domains whose Bergman metrics have constant holomorphic sectional curvatures, and characterize such domains that are biholomorphic to a ball possibly less a relatively closed pluripolar set. Sufficient conditions for the continuous extension of the biholomorphisms to the closures are given in terms of the Bergman kernel.
Freid Tong	Title: A priori estimates for fully nonlinear equations in complex geometry Abstract: We will present a new method for uniform a priori estimates for equations in complex geometry, which works for a wide class of fully nonlinear equations and applies even in degenerate settings. This is based on joint work with B. Guo and D.H. Phong
Gunhee Cho	Title: Stochastic Schwarz lemma and Carathéodory metric on Kähler manifolds Abstract: Yau–Royden's Schwarz lemma is a fundamental tool in complex geometry to investigate canonical invariant metrics on negatively curved complex manifolds. We will introduce the very recent progress of a stochastic version of the new Schwarz lemma on complete Kähler manifolds. We will also discuss a lower bound of integrated Carathéodory–Reiffen metric on complete non-compact simply-connected Kähler manifold with negative sectional curvature.

Sven Hirsch	Title: On a generalization of Geroch's conjecture Abstract: The theorem of Bonnet-Myers implies that manifolds with topology $M^{n-1}\times S^1$ do not admit a metric of positive Ricci curvature, while the resolution of Geroch's conjecture shows that the torus T^n does not admit a metric of positive scalar curvature. In this talk I will introduce a new notion of curvature which interpolates between Ricci and scalar curvature (so-called m-intermediate curvature) and use stable weighted slicings to show that for $n\le7$ the manifolds M^{n-m}\times T^m do not admit a metric of positive m-intermediate curvature. This is joint work with Simon Brendle and Florian Johne.
Tin Yau Tsang	Title: Another perspective on Gromov's conjectures Abstract: Gromov suggests that we can understand scalar curvature on a compact manifold by studying the geometry of its boundary. In this talk, we will see the role of spacetime positive mass theorem in answering Gromov's questions in terms of general relativity (initial data sets).