## Abstracts

Tristan Collins
*Spinor flows with flux*
I will introduce a coupled system of nonlinear heat flows whose critical points are spinors which are parallel with respect to a certain connection with flux. These critical equations are motivated by the equations of motion in supergravity. I will describe the basic properties of these flows, including short-time existence and smoothing estimates. This is joint work with D.H. Phong.

Tamas Darvas
*The volume of pseudoeffective line bundles*
Let $L$ be a line bundle with positive singular Hermitian metric $he^{-u}$, on an $n$-dimensional compact Kähler manifold $X$. Let $h_k$ be the dimension of the space of global sections of $L^k$ that are $L^2$-integrable with respect to the weight $e^{-ku}$. We show that the limit of $h_k/k^n$ exists, and equals the non-pluripolar volume of the I-model potential associated to $u$. Joint work with Mingchen Xia.

Claude LeBrun
*Einstein Manifolds, Self-Dual Weyl Curvature, and Conformally Kähler Geometry*
There are certain compact 4-manifolds, such as real and complex hyperbolic 4-manifolds, 4-tori, and K3, where we completely understand the moduli space of Einstein metrics. But there are vast numbers of other 4-manifolds where Einstein metrics are known to exist, but where we cannot currently determine whether or not there might exist new Einstein metrics that might be quite unlike the ones we currently know. In this talk, I will describe two different characterizations of the known Einstein metrics on del Pezzo surfaces that lead a better understanding of the moduli spaces of Einstein metrics on these specific 4-manifolds. I will then indicate some new avenues of research that are suggested by these results.

Julius Ross
*Prekopa's Theorem, the Brunn-Minkowski inequality, and the Interpolation problem*
I will discuss a very general extension of Prekopa's Theorem, the Brunn Minkowski Inequality, and the Minimum Principle within the context of "F-subharmonicity" of Havey-Lawson and its application to the interpolation problem. This work is joint with David Witt Nyström.

Xi Sisi Shen
*Metrics of constant Chern scalar curvature and a Chern-Calabi flow*
We discuss the existence problem of constant Chern scalar curvature metrics on a compact complex manifold. We prove a priori estimates for these metrics conditional on an upper bound on the entropy, extending a recent result by Chen-Cheng in the Kähler setting. In addition, we show how these estimates

can be used to prove a convergence result for a Hermitian analogue of the Calabi flow on compact complex manifolds with vanishing first Bott-Chern class.

Jacob Sturm
*Negatively curved Kähler-Einstein metrics and moduli spaces of stable varieties*
We will discuss some estimates for negatively curved Kähler-Einstein metrics on compact manifolds that depend only on their dimension and volume. These are applied to prove that if $X_i$ is a sequence of such manifolds with fixed dimension and volume, that there is a subsequence which converges. We will also describe an application to $\mathcal{M}(n, V)$, which is the compactified moduli space of all Kahler-Einstein varieties of dimension $n$ and volume $V$. We show that the Weil-Petersson metric, which is a positive closed (1,1)-current on the projective variety $\mathcal{M}(n, V)$, has continuous local potentials (generalizing Wolpert's theorem which treats the case $n = 1$). We also show how one can combine these ideas with the technique of Donaldson-Sun to give a new proof of the Deligne-Mumford stable reduction theorem. This is joint work with Jian Song and Xiaowei Wang.

Christina Tønnesen-Friedman
*Constant Scalar Curvature Sasaki Metrics from the Ground Up*
This talk is based on joint work with Charles P. Boyer. A Sasaki mani(orbi)fold $(M, \mathcal{S})$ comes with a family of Sasakian structures parameterized by the Sasaki cone $\mathfrak{t}^+$ of $\mathcal{S}$. An important question is whether there exists a constant scalar curvature (CSC) Sasaki metric in $\mathfrak{t}^+$.

Motivated by the orbifold Boothby-Wang construction of Sasaki structures over Kähler orbifolds, we will introduce a certain type of polarized stage 3 Bott orbifold, $(S_{\mathbf{n}}, \Delta_{\mathbf{m}}, [\omega_{\mathbf{n},\mathbf{m}}])$. We will then discuss how one can obtain CSC Sasaki structures in the corresponding Sasaki cone $\mathfrak{t}^+$, either directly (in the initial Sasaki ray) from the Boothby-Wang construction over $(S_{\mathbf{n}}, \Delta_{\mathbf{m}}, [\omega_{\mathbf{n},\mathbf{m}}])$, when $[\omega_{\mathbf{n},\mathbf{m}}]$ happens to admit a CSC orbifold Kähler metric (determined by diophantine equations), or indirectly, using the weighted extremal approach of Apostolov and Calderbank. Both methods use the so-called admissible construction of orbifold Kähler metrics on $(S_{\mathbf{n}}, \Delta_{\mathbf{m}})$ and are providing explicit examples.