NORDAN 2015, REYKJAVÍK
– Mini-workshops, Friday April 24 –

INTEGRAL FORMULAS ON SINGULAR COMPLEX SPACES, 9:00-12:00

Organizer: Jean Ruppenthal, University of Wuppertal

9:00 – 9:45 Emmanuel Mazzilli
AN ALTERNATIVE CONSTRUCTION OF RESIDUE CURRENTS TYPE IN COMPLETE INTERSECTION AND APPLICATIONS

9:50 – 10:20 Mats Andersson
EXOTIC $(p,0)$-CURRENTS SUCH THAT $\overline{\partial}u = 0$

10:20 – 10:30 Break

10:30 – 11:00 Richard Lärkäng
ESTIMATING INTEGRALS OF RADIAL FUNCTIONS ON SUBVARIETIES OF $\mathbb{C}^N$

11:05 – 11:25 Jean Ruppenthal
SOME ADVANTAGES OF $\overline{\partial}$-HOMOTOPY INTEGRAL FORMULAS ON SINGULAR VARIETIES

11:30 – 12:00 Elizabeth Wulcan
DU VAL SINGULARITIES

ELLIPTIC COMPLEX GEOMETRY, 14:00-17:00

Organizer: Finnur Lárusson, University of Adelaide

14:00 – 14:30 Rafael Andrist
THE FIBRED DENSITY PROPERTY AND ANDERSEN-LEMPERT THEORY

14:45 – 15:15 Richard Lärkäng
OKA THEORY FOR SINGULAR TARGETS

15:30 – 16:00 Alexandre Ramos
AN OKA PRINCIPLE FOR PARAMETRIC FAMILIES OF AUTOMORPHISMS

16:15 – 16:45 Tyson Ritter
ON A NULL-HOMOTOPIC EMBEDDING OF THE PUNCTURED PLANE INTO $\mathbb{C} \times \mathbb{C}^*$

– INTEGRAL FORMULAS ON SINGULAR COMPLEX SPACES –

EMMANUEL MAZZILLI

AN ALTERNATIVE CONSTRUCTION OF RESIDUE CURRENTS TYPE IN COMPLETE INTERSECTION AND APPLICATIONS

ABSTRACT: In my talk, I will describe how to construct currents with similar properties of Coleff-Herrera-Passare's currents in the complete intersection case. Then, I will discuss some applications in complex analysis.

MATS ANDERSSON

EXOTIC $(p,0)$-CURRENTS SUCH THAT $\overline{\partial}u = 0$

ABSTRACT: Let X be a reduced analytic space. An old result of Barlet, formulated in terms of currents, states that if u is a $(p,0)$-current such that $\overline{\partial}u = 0$, then there is a unique decomposition $u = h + a$, where h is meromorphic, $\overline{\partial}h = 0$, and a has support on X_{sing}. I will indicate a proof (that maybe works also for a non-reduced space in case $p = n$, using the definition of $\overline{\partial}$ in a joint work in progress with Lärkäng). I will also give a non-trivial explicit example of such an exotic $(p,0)$-current a.

RICHARD LÄRKÄNG

ESTIMATING INTEGRALS OF RADIAL FUNCTIONS ON SUBVARIETIES OF $\mathbb{C}^N$

ABSTRACT: I will talk about a result which gives a method for estimating integrals on subvarieties of $\mathbb{C}^N$. The result states that the integral of a positive radial function on a ball of radius r on an n-dimensional subvariety of $\mathbb{C}^N$ is comparable to the integral of the corresponding radial function on a ball of radius r in $\mathbb{C}^n$. I will then briefly mention how one can use this to obtain results about L^p mapping properties for Koppelman type integral formulas on homogeneous hypersurfaces in $\mathbb{C}^N$ with isolated canonical singularities.

JEAN RUPPENTHAL

ADVANTAGES OF $\overline{\partial}$-HOMOTOPY INTEGRAL FORMULAS ON SINGULAR VARIETIES

ABSTRACT: Most results on the $\overline{\partial}$-operator on singular complex spaces are achieved by means of L^2-methods (apriori estimates) and methods of complex differential geometry. I will explain some reasons why it is also important to attack the $\overline{\partial}$-problem on singular spaces by means of integral representation formulas.

One reason is the following: if we can produce an L^2-homotopy formula for the $\overline{\partial}$-operator by means of suitable integral formulas, then this gives at the same time an L^p-homotopy formula for all $p > 2$, and even in the continuous category.

A second reason is another regularity issue. On singular spaces, one has to deal with various closed extensions of the $\overline{\partial}$-operator. Usually L^2-methods allow just to deal with the $\overline{\partial}$-operator in the sense of distributions, whereas integral formulas can give direct access to results about other closed extensions without additional efforts. Particularly for the minimal closed extension of the $\overline{\partial}$-operator which is important e.g. for L^2-Serre duality on singular spaces.

ELIZABETH WULCAN

DU VAL SINGULARITIES

ABSTRACT: Du Val singularities are in a sense the simplest surface singularities and there are many equivalent characterizations of them. For example, they are the canonical singularities in dimension 2. I will discuss a very classical characterization in terms of Dynkin diagrams that I find particularly neat. In particular, I will show how Du Val singularities can be resolved by replacing the singular point by an exceptional divisor whose dual graph is a Dynkin diagram.

– Elliptic Complex Geometry –

Rafael Andrist, Wuppertal

The fibred density property and Andersen-Lempert theory

Abstract: The notion of the density property for complex manifolds can be generalized to holomorphic fibrations where it holds only along the fibre direction, and the Andersen-Lempert theorem can be adapted to fibre preserving maps. We will discuss applications and open problems.

Richard Lärkäng, Wuppertal

Oka theory for singular targets

Abstract: I will briefly discuss a joint work with Finnur Lárusson about the interpolation property for affine toric varieties, showing that in contrast to the case of smooth targets, the convex interpolation property and the interpolation property are no longer equivalent when the targets are allowed to have singularities. I will also discuss briefly other natural open questions in regards to Oka theory for singular targets.

Alexandre Ramos, Bern

An Oka principle for parametric families of automorphisms

Abstract: Consider a family of N points in an Oka-Forstneric manifold X, whose positions are parametrized by a Stein manifold. In this talk, we show how to combine a parametric version of the Andersen-Lempert theorem on X with Gromov's Oka principle, to obtain a holomorphic family of automorphisms of X mapping the parametrized points to any prescribed parametrized N-tuple on X. From a homotopic viewpoint this corresponds to an Oka or homotopy principle. Interesting considerations arise when studying the assumptions under which the automorphisms can be chosen in a particular class (volume preserving, or preserving some symplectic form), which (if time permits) I would like to discuss.

Tyson Ritter, Oslo

On a null-homotopic embedding of the punctured plane into $\mathbb{C} \times \mathbb{C}^*$

Abstract: It is trivial to write down a proper holomorphic embedding of the punctured plane $C*$ into $\mathbb{C} \times \mathbb{C}^*$ with any non-zero winding number. On the other hand, however, it is an open question whether there exists such an embedding with zero winding number, that is, a null-homotopic proper holomorphic embedding of $\mathbb{C}^*$ into $\mathbb{C} \times \mathbb{C}^*$. I will present some partial results on the form of such an embedding, should it exist, and indicate the core difficulty underlying the problem. I will also mention a closely related problem, considered by Globevnik, on a proper holomorphic embedding of $\mathbb{C}$ into $\mathbb{C}^2$ that avoids both coordinate axes. This is joint work with Finnur Lárusson.