助教 Stefan Helmke (Algebraic Geometry)

I am still working on a theory of local uniformizations, which attempts to uniformize all elements of a regular local ring over a field of characteristic zero in a uniform fashion. That is to say, that for every $\epsilon > 0$ there should exist a local uniformization such that the order of the initial form of any element of the regular local ring defined by the uniformization is less than ϵ times the real part of the value of the element (as explained in more detail in a previous report). Unfortunately it seems that any uniformization algorithm always blows up to much for this purpose at first and one must then later blow-down something again. In fact, when one tries to generalize Newton's method of the rotating ruler to higher dimensions this phenomenon naturally occurs, but the blowing down process is not so well-defined; it depends on some additional choices which I do not quite understand yet. However, at least in some cases the algorithm works now. In applications one would be more interested in log-canonical thresholds rather than vanishing orders and those would of course not depend on the blowing down process, so that there is also the possibility that one could perhaps reformulate the problem in order to avoid this difficulty altogether.

Once this problem is settled, it would imply that for an ample Cartier divisor on a projective variety there exists a bounded family of smooth proper birational morphisms onto that variety with a simple normal crossing divisor, such that any effective Q-divisor equivalent to the given divisor which is log-canonical but not log-terminal has log-discrepancy zero along a toric valuation with respect to the simple normal crossing divisor on at least one member of this family. This is still the missing part of my proof of Fujita's Conjecture and therefore I am making all efforts to solve this ineresting problem.

[1] S. Helmke, *On Fujita's conjecture,* Duke Math. J. 88 (1997), 201–216.

[2] S. Helmke, *On global generation of adjoint linear systems,* Math. Ann. 313 (1999), 635–652.

[3] S. Helmke, *The base point free theorem and the Fujita conjecture,* Vanishing theorems and effective results in algebraic geometry, ICTP Lecture Notes 6, Trieste, 2001, 215–248.

[4] S. Helmke, *Multiplier ideals and basepoint freeness,* Oberwolfach reports 1, 2004, 1137–1139.

[5] S. Helmke, *New Combinatorial Methods in Algebraic Geometry,* in preparation.

[6] S. Helmke, *On local uniformizations,* in preparation.