

Oberwolfach seminar:
Berkovich spaces and degenerations of Calabi-Yau varieties

Organizers : Sébastien Boucksom (École Polytechnique de Paris), Mattias Jonsson (University of Michigan), Johannes Nicaise (Imperial College London)

Dates : 16 October - 22 October 2016

Programme :

The aim of the seminar is to give a general survey of some recent developments connecting non-archimedean geometry to the study of degenerations of Calabi-Yau varieties in the context of Mirror Symmetry and the Minimal Model Program.

- Introduction to Berkovich spaces; relation with valuation theory and birational geometry.
- Construction and basic properties of the essential skeleton; connections with the Minimal Model Program; application to Igusa zeta functions.
- Potential theory on Berkovich spaces and the Yau-Tian-Donaldson conjecture.
- Degenerations of Calabi-Yau varieties and Mirror Symmetry.

Introductory reading :

- M. Gross, Mirror symmetry and the Strominger-Yau-Zaslow conjecture, arXiv:1212.4220.
- J. Nicaise, Berkovich skeleta and birational geometry. To appear in: M. Baker and S. Payne (eds.), *Nonarchimedean and Tropical Geometry*, Simons Symposia, pages 179-200 (2016), arXiv:1409.5229. This survey paper also contains several references to research articles related to the topics of the seminar.

Research papers :

- M. Gross, V. Tosatti and Y. Zhang, Collapsing of abelian fibered Calabi-Yau manifolds. *Duke Math. J.* 162:3 (2013), 517-551.
- M. Kontsevich and Y. Soibelman, Affine structures and non-archimedean analytic spaces. In: P. Etingof, V. Retakh and I.M. Singer (eds). *The unity of mathematics*. Volume 244 of *Progress in Mathematics*. Birkhäuser Boston, Inc., Boston, MA (2006), 312-385.
- X. Rong and Y. Zhang, Degeneration of Ricci-flat Calabi-Yau manifolds. *Communications in Contemporary Mathematics* 15:4 (2013), 1250057 (8 pages)
- W.-D. Ruan and Y. Zhang, Convergence of Calabi-Yau manifolds. *Advances in Mathematics* 228 (2011), 1543–1589.