Geometric aspects of p-adic Hodge theory (M16)

Non-Examinable (Graduate Level)

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p-adic Hodge theory is a p-adic counterpart of classical Hodge theory: it studies the natural structures found on the cohomology of algebraic varieties over a p-adic field. Some of these structures (such as a Galois action) arise from the arithmetic of the base field, while others (such as a Frobenius action) arise from the geometry of integral models. The aim of this course is twofold. On the one hand, we will discuss some of these structures, in particular prove the Hodge-Tate decomposition theorem. On the other hand, we aim to do so while touching some of the recent important theories and tools in this field, developed by B. Bhatt, M. Morrow and P. Scholze. In particular we will use the language of perfectoid spaces and we will give a short introduction to pro-étale cohomology.

Pre-requisites

This course assumes that you have some knowledge about étale cohomology, rigid analytic varieties, formal schemes and perfectoid spaces.

Literature

1. B. Bhatt, M. Morrow, P. Scholze, Integral p-adic Hodge theory *Publ. Math. Inst. Hautes Etudes Sci.* 128 (2018)
2. G. Faltings, p-adic Hodge theory *J. Amer. Math. Soc.* 1. (1988)
3. P. Scholze, Perfectoid spaces *Publ. Math. Inst. Hautes Etudes Sci.* 116 (2012)
4. P. Scholze, p-adic Hodge theory for rigid analytic varieties *Forum of Mathematics, Pi* Vol. 1 (2013)

Additional support

If there is interest, example sheets can be provided for this course.