

FARGUES-FONTAINE CURVE STUDY GROUP

DATE: TBD Weeks 1 - 8 · TIME: TBD · LOCATION: TBD

OVERVIEW

This is a study group on the schematic point of view of the Fargues-Fontaine Curve. We plan to closely follow [3, Chapter 2].

For a nice overview (recommended reading before the first talk), see Morrow's Bourbaki talk [8]. Other references include the more informal notes by Anschütz [1], and the comprehensive book [4] by Fargues and Fontaine. There are also notes from a lecture course by Lurie [7].

SCHEDULE

- WEEK 1: *Holomorphic Functions of the Variable π (Part 1)*, §1.1,
- WEEK 2: *Holomorphic Functions of the Variable π (Part 2)*, §1.2,
- WEEK 3: *The Space $|Y|$ (Part 1)*, §2.1-2.3,
- WEEK 4: *The Space $|Y|$ (Part 2)*, §2.4-2.6,
- WEEK 5: *Divisors on Y* , §3,
- WEEK 6: *Divisors on $Y/\varphi^{\mathbb{Z}}$* , §4,
- WEEK 7: *The Curve*, §5,
- WEEK 8: *Vector Bundles*, §6.1 - 6.3.3.

Further Directions. Next term, this study group could be continued by linking things more closely to the our p -adic Hodge Theory study group from last year, focusing on some subset of the following topics:

- Vector bundles on The Curve and φ -modules ([3, Chapter 2, §7]),
- Applications to p -adic Hodge Theory:
 - Weakly admissible implies admissible [1, §14],
 - p -adic Monodromy Theorem¹,
- The Curve as an adic space [5],
- GAGA for The Curve [5],
- Geometrisation of the Local Langlands Correspondence [5],
- Banach-Colmez Spaces and The Curve [6],
- Integral p -adic Hodge Theory.

However, we haven't decided what to do next term. Another possibility that was suggested was a study group on Integral p -adic Hodge Theory following [2].

Date: September 27, 2022.

¹The introduction to [3, Chapter 2] claims that it is apparently possible to prove this somehow using the curve, but there is no proof in the references they provide

REFERENCES

- [1] Johannes Anschütz. *Lecture Notes: Lectures on the Fargues-Fontaine Curve*.
- [2] Bhargav Bhatt, Matthew Morrow, and Peter Scholze. Integral p -adic Hodge theory. *Publ. Math. Inst. Hautes Études Sci.*, 128:219–397, 2018.
- [3] Fred Diamond, Payman L. Kassaei, and Minhyong Kim, editors. *Automorphic forms and Galois representations. Vol. 2*, volume 415 of *London Mathematical Society Lecture Note Series*. Cambridge University Press, Cambridge, 2014.
- [4] Laurent Fargues and Jean-Marc Fontaine. Courbes et fibrés vectoriels en théorie de Hodge p -adique. *Astérisque*, (406):xiii+382, 2018. With a preface by Pierre Colmez.
- [5] Laurent Fargues and Peter Scholze. Geometrization of the local langlands correspondence, 2021.
- [6] Arthur-César Le Bras. Espaces de Banach-Colmez et faisceaux cohérents sur la courbe de Fargues-Fontaine. *Duke Math. J.*, 167(18):3455–3532, 2018.
- [7] Jacob Lurie. *Course Notes: The Fargues-Fontaine Curve*.
- [8] Matthew Morrow. The Fargues-Fontaine curve and diamonds [d’après Fargues, Fontaine, and Scholze]. *Astérisque*, (414, Séminaire Bourbaki. Vol. 2017/2018. Exposés 1136–1150):Exp. No. 1150, 533–571, 2019.