

Workshop on Pan’s perfectoid approach to p -adic modular forms

Description: The workshop focuses on Pan’s paper [Pan], which gives a geometric description of locally analytic vectors of completed cohomology of modular curves in terms of overconvergent p -adic modular forms. In addition to the standard lectures in the morning, there will be a (short and flexible) lecture together with a discussion section (hosted by the lecturer) in the afternoon each day.

Schedules:

Date	Time	Speaker	Content
Aug 22	9:00–10:00	Yiwen Ding	Introduction of Pan’s paper: Give a gentle introduction on Pan’s paper.
	10:15–11:15	Yupeng Wang	Locally analytic vectors in the geometric setup I: Cover [Pan, §3.1–3.3].
	11:30–12:30	Heng Du	Locally analytic vectors in the geometric setup II: Cover [Pan, §3.4–3.6].
	14:00–16:30	Hui Gao	Sen’s theory: Discuss classical Sen’s theory on p -adic extensions of local fields and its locally analytic generalization due to Berger-Colmez.
Aug 23	9:00–10:30	Daxin Xu	Locally analytic vectors in completed cohomology of modular curves I: Follow [Pan, §4.1, §4.2].
	11:00–12:30	Jiahong Yu	Locally analytic vectors in completed cohomology of modular curves II: Follow [Pan, §4.4].
	14:00–16:30	Xu Shen	Perfectoid Shimura varieties: Discuss Scholze’s theory on perfectoid Shimura varieties, Hodge-Tate maps etc. and discuss the work of Liu-Zhu on Riemann-Hilbert correspondence.
Aug 24	9:00–10:30	Tian Qiu	Localization for the locally analytic vectors I: Follow [Pan, §4.3].
	11:00–12:30	Tian Qiu	Localization for the locally analytic vectors II: Follow [Pan, §5.1].
	14:00–16:30	Liang Xiao	BB localization and representation theory of real Lie groups: Discuss Beilinson-Bernstein localization theory and some representation theory of real Lie groups.

Aug 25	9:00–10:30	Yiwen Ding	Computation of n-cohomology of locally analytic vectors I: Cover [Pan, §5.2-5.4].
	11:00–12:30	Yiwen Ding	Computation of n-cohomology of locally analytic vectors II: Cover [Pan, §5.2-5.4].
	14:00–16:30	Liang Xiao	p-adic modular forms: Discuss the various definitions of p -adic modular forms.
Aug 26	9:00–10:30	Yongquan Hu	Applications of the main result I: [Pan, §6].
	11:00–12:30	Yongquan Hu	Applications of the main result II: [Pan, §6].
	14:00–16:30	Shanwen Wang	Local-global compatibility: Discuss Emerton’s local-global compatibility result and some related results of Colmez-Wang. Discuss the theory of weight one modular forms.

REFERENCES

- [BC08] Laurent Berger and Pierre Colmez, Familles de représentations de de Rham et monodromie p -adique, *Astérisque* **319** (2008), 303–337.
- [BC16] Laurent Berger and Pierre Colmez, Théorie de Sen et vecteurs localement analytiques, *Ann. Sci. Ec. Norm. Supér.* **49** (2016), 947–970.
- [CW] Pierre Colmez and Shanwen Wang, Une factorisation du système de Beilinson-Kato, **arXiv preprint arXiv:2104.09200**, (2021).
- [LZ] Ruochuan Liu and Xinwen Zhu, Rigidity and a Riemann–Hilbert correspondence for p -adic local systems, *Invent. Math.* **207** (2017), 291–343.
- [Pan] Lue Pan, On locally analytic vectors of the completed cohomology of modular curves, *Forum of Mathematics, Pi*, Volume 10 , (2022), e7.
- [Scho] Peter Scholze, On torsion in the cohomology of locally symmetric varieties, *Annals of Mathematics*, **182** (2015), 945–1066.