Spring 2023: p-adic Hodge Theory Memo: Week 0

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1 Logistics

- When: Wednesdays, 4:20-5:50 PM ET
- Where: Room 622
- Organizer: Xiaorun Wu

2 Meeting Details

- There will be 13-14 meetings in total.
- I (Xiaorun Wu) will do most of the presentations, but if you are interested in presenting, let me know by the Saturday of **the week before** the presentation.
  - E.g. if the presentation is on **Wed, Jan 25th**, then let me know by **Sat Jan 21st**.
- Notes will be shared the day before lecture: i.e. Tuesday if the actual presentation is Wednesday. I will send out email beforehand.

3 Mailing List

All the people thus far requested to be added be in mailing list had been added. But I might accidentally forgot you—please forgive me for me goldfish memory and carelessness **and let me know**!

4 Syllabus Overview

Please see the file here. These are the things I plan on going through. I plan to spend 6 weeks on part O, I, & II (These are the foundational topics anyways), these give us a lot to digest over the first half of the semester, and are necessary topics anyways (in order to set up later topics on Fagues-Fontaine curves)

However, for the second half of the semester, there are a little bit of leeway on what we want to do. Here are some of the topics that we **might be thinking of covering:** (Not organized in any order: listed in the order of being proposed)

- ℓ-adic representation of local fields.
- p-adic representation of characteristic p, in greater detail:
  - B-representation and -representations and regular G-rings;
  - Mod p Galois representations of fields of characteristic $p > 0$;
  - p-adic Galois representations of fields of characteristic $p > 0$
- C-representations and method of Sen: TS1, TS2, TS3, etc.
- ring R and (φ, Γ)-module
- semi-stable p-adic representations:

– $B_{\mathbf{cris}}$ and $B_{\mathbf{st}}$;
– Filtered (φ, N)-modules;
– Theorem A (weakly admissable $\Rightarrow$ admissable) & Theorem B (de Rham $\Rightarrow$ potentially semi-stable), and their proof