

Compactification of moduli spaces of shtukas.

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Drinfeld's shtukas play an important role in the proof of Drinfeld and Lafforgue of the Langlands correspondence for general linear groups over function fields. The most difficult task is to compactify moduli spaces classifying Drinfeld's shtukas. The compactification will be the subject of my lectures.

I will define the notion of Drinfeld's shtuka, their classifying moduli spaces, their properties and the process of truncations by the polygon of Harder-Narasimhan. Then I will introduce the construction of compactifications of Lafforgue and sketch his proof using the semistable reduction of Langton. Finally, I will explain how one can use the Geometric Invariant Theory to rediscover these compactifications and to construct new ones. A discussion of the advantages of each method will be given.

Suggested reading:

- Introduction to the GIT theory:
 1. Mumford, D.; Fogarty, J.; Kirwan, F. Geometric invariant theory. Third edition. *Ergebnisse der Mathematik und ihrer Grenzgebiete (2)* , 34. Springer-Verlag, Berlin, 1994. xiv+292 pp.
- Introduction to stacks:
 2. Gómez, Tomás L. Algebraic stacks. *Proc. Indian Acad. Sci. Math. Sci.* 111 (2001), no. 1, 1–31.
- Introduction to Drinfeld's shtukas:
 3. Drinfeld, V. G. Moduli varieties of F -sheaves. *Funktsional. Anal. i Prilozhen.* 21 (1987), no. 2, 23–41.
 4. Lafforgue, Laurent Chtoucas de Drinfeld et conjecture de Ramanujan-Petersson. *Astérisque* No. 243 (1997), (first chapter)
 5. Lafforgue, Laurent Une compactification des champs classifiant les chtoucas de Drinfeld. *J. Amer. Math. Soc.* 11 (1998), no. 4, 1001–1036.