FALL 2021 AG READING GROUP: BRAUER GROUPS

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1. Introduction

The goal of this reading group is to work through some parts of the upcoming book by Colliot-Thélène and Skorobogatov [CTS21]. The goal of any given lecture is not to go through the details of every technical proof. Rather, it is to give a big picture overview of the topic, with definitions, examples, and theorem statements. Brief sketches of proofs to indicate logical dependencies of the material are OK.

2. Fall 2021

Lecture 1 (08/25). The language of Central Simple Algebras: corresponding to §1.2 of [CTS21]. This will be mostly warm-up review.

Lecture 2 (09/08). The language of Galois Cohomology: corresponding to §1.3 of [CTS21]. This will also be mostly warm-up review.

Lecture 3 (09/22). Galois Cohomology of discretely valued fields: corresponding to §1.4 of [CTS21]. This will likely contain material many in the audience have not seen before.

Lecture 4 (10/06). Étale cohomology I: corresponding to §2.1 of [CTS21]. Grothendieck topologies, presheaves and sheaves, points and stalks, morphisms of sites.

Lecture 5 (10/20). Étale cohomology II: corresponding to §2.2 and §2.4 of [CTS21]. Definition of cohomology. Relation to Galois cohomology; some standard spectral sequences and computation of a few cohomology groups.

Lecture 6 (11/03–Tony out of town). Étale cohomology III: corresponding to §2.5 of [CTS21]. Construction of the Picard Scheme.

Lecture 7 (11/17). Smooth Varieties I: corresponding to §4.1–§4.2 of [CTS21].

3. Spring 2022

Exact dates to be determined.

Lecture 8. Smooth Varieties II: corresponding to §4.3–§4.4 of [CTS21].

Lecture 9. Smooth Varieties III: corresponding to §4.5–§4.6 of [CTS21].

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Lecture 10. Unramified Brauer Groups: corresponding to §5.2 of [CTS21].

Lecture 11. Severi–Brauer varieties: corresponding to §6.1 of [CTS21].

Lecture 12. The Brauer–Manin Set I: corresponding to §12.1–12.2 of [CTS21].

Lecture 13. The Brauer–Manin Set II: corresponding to §12.3–12.4 of [CTS21].

Lecture 14. The Brauer–Manin Set III: corresponding to §12.5–12.6 of [CTS21].

References

[CTS21] J.-L. Colliot-Thélène and A. N. Skorobogatov, *The Brauer–Grothendieck group*, 2021. ↑1, 2, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 3

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[Gro68b] ———, *Le groupe de Brauer. II. Théorie cohomologique*, Dix exposés sur la cohomologie des schémas, Adv. Stud. Pure Math., vol. 3, North-Holland, Amsterdam, 1968, pp. 67–87 (French). ↑

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[Mil80] J. S. Milne, *Étale cohomology*, Princeton Mathematical Series, No. 33, Princeton University Press, Princeton, N.J., 1980. ↑

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