

1. LECTURE 1-CYCLE COMPLEXES

- 1.1. Bloch's cycle complex.
- 1.2. Suslin homology.
- 1.3. Suslin-Friedlander complexes.
- 1.4. Comparison theorems.
- 1.5. Products.

2. LECTURE 2-CATEGORIES OF MOTIVES

- 2.1. Voevodsky's geometric motives.
- 2.2. Triangulated categories of motives.
- 2.3. The Tate subcategory of  $\mathcal{DM}$ .

3. LECTURE 3-CDGAS, HOPF ALGEBRAS AND MIXED TATE MOTIVES

- 3.1. Dg modules over an Adams graded cdga.
- 3.2. Minimal models, co-Lie algebras and co-module categories.
- 3.3. The Bloch-Kriz category.
- 3.4. Spitzweck's representation theorem.

4. LECTURE 4-TATE MOTIVES AND FUNDAMENTAL GROUPS

- 4.1. The fundamental exact sequence.
- 4.2. Polylog.
- 4.3. Towards a minimal model for  $\mathbb{P}^1 \setminus \{0, 1, \infty\}$ .
- 4.4. Tate motives over  $\mathbb{Z}$ -Brown's theorem.

5. LECTURE 5- $\pi_0$  AND  $\pi_1$  IN  $\mathbb{A}^1$  HOMOTOPY THEORY

- 5.1. Motivic homotopy theory.
- 5.2. Morel's connectedness theorem.
- 5.3. Morel's theorem on  $\pi_0$  of the sphere spectrum.
- 5.4.  $\pi_1(\mathbb{P}^1)$  and  $\pi_1(\mathbb{A}^2 - \{0\})$ .
- 5.5. The motivic Steinberg relation.

## REFERENCES FOR LECTURE 1

- [1] Bloch, S. *Algebraic cycles and higher K-theory*. Adv. in Math. **61** (1986), no. 3, 267–304.
- [2] Bloch, Spencer. *The moving lemma for higher Chow groups*. J. Algebraic Geom. **3** (1994), no. 3, 537–568.
- [3] Levine, Marc. *Techniques of localization in the theory of algebraic cycles*, J. Alg. Geom. **10** (2001) 299-363.
- [4] Levine, Marc. *Bloch’s higher Chow groups revisited. K-theory* (Strasbourg, 1992). Astérisque No. 226 (1994), 10, 235–320.
- [5] Voevodsky, V.; Suslin, A.; Friedlander E. **Cycles, Transfers and Motivic Homology Theories**. Annals of Math. Studies **143**, Princeton Univ. Press, 2000.

## REFERENCES FOR LECTURE 2

- [1] Huber, Annette; Kahn, Bruno. *The slice filtration and mixed Tate motives*. Compos. Math. **142** (2006), no. 4, 907936.
- [2] Levine, Marc. *Tate motives and the vanishing conjectures for algebraic K-theory*. Algebraic K-theory and algebraic topology (Lake Louise, AB, 1991), 167–188, NATO Adv. Sci. Inst. Ser. C Math. Phys. Sci., **407**, Kluwer Acad. Publ., Dordrecht, 1993.
- [3] Voevodsky, V.; Suslin, A.; Friedlander E. **Cycles, Transfers and Motivic Homology Theories**. Annals of Math. Studies **143**, Princeton Univ. Press, 2000.

## REFERENCES FOR LECTURE 3

- [1] Bloch, Spencer. *Algebraic cycles and the Lie algebra of mixed Tate motives*. J. Amer. Math. Soc. **4** (1991), no. 4, 771–791.
- [2] Bloch, Spencer; Kriz, Igor. *Mixed Tate motives*. Ann. of Math. (2) **140** (1994), no. 3, 557–605.
- [3] Kriz, Igor; May, J. P. **Operads, algebras, modules and motives**. Astérisque No. 233 (1995)
- [4] Levine, Marc. *Tate motives and the fundamental group, Cycles, Motives and Shimura Varieties*, ed. V. Srinivas, 265–392. Tata Institute of Fundamental Research, Mumbai, India, August 2010.

## REFERENCES FOR LECTURE 4

- [1] Beilinson, A.A.; Deligne, Pierre. *Interprétation motivique de la conjecture de Zagier reliant polylogarithmes et régulateurs*. Motives (Seattle, WA, 1991), 97–121, Proc. Sympos. Pure Math., **55**, Part 2, Amer. Math. Soc., Providence, RI, 1994.
- [2] Deligne, Pierre. *Le groupe fondamental de la droite projective moins trois points*. Galois groups over  $\mathbb{Q}$  (Berkeley, CA, 1987), 79–297, Math. Sci. Res. Inst. Publ., **16**, Springer, New York-Berlin, 1989.
- [3] Deligne, Pierre. *Catégories tannakiennes*. The Grothendieck Festschrift, Vol. II, 111–195, Progr. Math., **87**, Birkhäuser Boston, Boston, MA, 1990.
- [4] Deligne, Pierre; Goncharov, A.B. *Groupes fondamentaux motiviques de Tate mixte*. Ann. Sci. École Norm. Sup. (4) **38** (2005), no. 1, 156.
- [5] Goncharov, A. B.; Manin, Yu. *Multiple  $\zeta$ -motives and moduli spaces  $\overline{\mathcal{M}}_{0,n}$* . Compos. Math. **140** (2004), no. 1, 1–14.
- [6] Huber, Annette; Wildeshaus, Jörg. *Classical motivic polylogarithm according to Beilinson and Deligne*. Doc. Math. **3** (1998), 27–133.
- [7] Levine, Marc. *Tate motives and the fundamental group, Cycles, Motives and Shimura Varieties*, ed. V. Srinivas, 265–392. Tata Institute of Fundamental Research, Mumbai, India, August 2010.

## REFERENCES FOR LECTURE 5

- [1] Asok, Aravind; Morel, Fabien. *Smooth varieties up to  $\mathbb{A}^1$ -homotopy and algebraic h-cobordisms*. Adv. Math. **227** (2011), no. 5, 19902058.
- [2] Morel, Fabien.  *$\mathbb{A}^1$ -algebraic topology over a field*. Lecture Notes in Mathematics Volume 2052, 2012

- [3] Morel, Fabien. *On the motivic  $\pi_0$  of the sphere spectrum*. Axiomatic, enriched and motivic homotopy theory, 219260, NATO Sci. Ser. II Math. Phys. Chem., 131, Kluwer Acad. Publ., Dordrecht, 2004.
- [4] Morel, Fabien; Voevodsky, Vladimir.  *$A^1$ -homotopy theory of schemes*. Inst. Hautes Études Sci. Publ. Math. No. 90 (1999), 45143 (2001).