Seminar WiSe 2014/2015: p-divisible groups

Prof. Dr. Elmar Große Klönne

p-divisible groups are omnipresent in arithmetic algebraic geometry. They hold the key for understanding Galois representations attached to elliptic curves or, more generally, abelian varieties. Their moduli spaces are the geometric fundament on which the known approaches to the local Langlands conjectures rest. They are important to understand the local structure of moduli spaces of abelian varieties. [To cite just one paper to motivate current interest in p-divisible groups (we are *not* going to work it through): J. Weinstein, The Geometry of Lubin-Tate spaces, http://math.bu.edu/people/jsweinst/FRGLecture.pdf)]

In this seminar we intend to learn the basic facts about p-divisible (formal) groups and the classification scheme for p-divisible (formal) groups in terms of *displays*, as worked out by T. Zink. We follow the text

[Z] T. Zink, Lectures on p-divisible group,

http://www.mathematik.uni-bielefeld.de/ zink/pDivGr1.pdf

Occasionally it will also be helpful to consult

[Z1] T. Zink, Cartiertheorie kommutativer formaler Gruppen

<u>1. Formal groups and formal group laws</u>

[Z] 1.1 – 1.8

<u>2. Tangent functor</u>

[Z] 1.9 – 1.19

<u>3. Lifting</u>

[Z] 1.20 – 1.24. To discuss 1.21 consult also [Z1]

<u>4. The Hyperalgebra</u>

[Z] 1.25 – 1.33

<u>5. The Lie algebra functor</u>

[Z] 1.34 – 1.40

<u>6. Divided powers, p-bases, Grothendieck-Messing exponential</u>

[Z] 1.41 – 1.48

<u>7. p-divisible formal groups</u>

[Z] 1.49 – 1.59

<u>8. Wittrings</u>

[Z] 2.1 – 2.16.1

<u>9. Displays</u>

[Z] 2.17 – line before 2.26

<u>10. Dieudonné modules; the Barsotti-Tate functor</u>

[Z] 2.26 – 2.29.1

<u>11. + 12. Nilpotent displays; the main theorems</u>

[Z] 2.30 – end of chapter 2

13. Classification of potentially formal p-divisible groups

[Z] 3.1 – 3.10