DAG Jussieu working group

September 2025

Abstract

The goal of this M2 working group is to understand the following :
"If you take a connective spectral commutative algebra A, the morphisms
in the postnikov tower of A are square zero extensions" It is thanks to
this theorem that you can work with higher structures and do DAG. It is
corollary 7.4.1.28 in higher algebra - Lurie

1 Program

Week-by-Week Breakdown:

1: Guest Talk – : Introduction to infinity categories 2/10/2025 This talk was
given by Tomas Fernandez. He presented all the definitions to reach and state
Straightening-Unstraightening.

2: Complements (to be seen in the lectures Homotopy 2) : Model categories
and simplicial sets: Alexis Miller 8/10/2025

3: More basics of ∞-categories: Davit 15/10/2025

4: Adjoint functors
Justin Carel

5: Differential graded categories.

6: Stable ∞ categories and examples : Derived infinity category and Spectra

7: Presentable categories and examples

8: E_∞ rings

9: Cotangent complex

10: Guest talk : Prof. JB Teyssier's Phd student Lucas Why derived algebraic geometry?

11: Derived schemes

12: Higher deformation theory

At some point : Phd Guest Nicolas Seroux, derived algebraic geometry and physics. At some point in january : Guest $Q\&A$ session with Prof. Victor Roca i Lucio. Guest Luc Saccochio ∞ operads (between 5, 6 or 7).

2   References

The notes for the talks are in the common Jussieu working group's website `https://m2fonda-gt.github.io/`. We also have a whattsapp group in case you want to be uptaded on sessions. Everyone is welcome to join the working group. From what people say about ∞-cats and derived algebraic geometry, the best way to learn it is to grab someone that knows it and to shake him very hard until you learn it. We welcome any expert who wants to help us by being squeezed : give talk, $Q\&A$ etc.. !

Contact : Marine Cases marinecases345@gmail.com

References

[Gal23] Martin Gallauer. *∞-Categories: A First Course*. Lecture notes for the Taught Course Centre, 2023;

[Cno25] Bastiaan Cnossen. *Introduction to Higher Algebra*. Lecture notes, University of Regensburg, 2025.

[Lur17] Jacob Lurie. *Higher Algebra*. `https://www.math.ias.edu/~lurie/papers/HA.pdf`

[PraEssen] *Little exercise sheet* Pramod Achar, exercise sheet for the Remold winter school, Essen. `https://lsu.box.com/s/k5xmtqzfws09gserlruxlhbefpg6j594`

[KhanKIAS] *Lecture Notes on ∞-categories*, Adeel A. Khan, lecture notes for the DAG course at KIAS, 2023. `https://www.preschema.com/lecture-notes/2023-kias/dagkias.pdf`