Student talks

1. Resolution model categories and the spiral exact sequence

(1) the resolution module structure

- A detailed outline of Section 3 and 4 of "Cosimplicial resolutions and homotopy spectral sequences", Bousfield [3]
- Examples (without proofs):
  1. Dwyer/Kan/Stover, 5.10, [6] 2. Our paper, section 4.1/5.1

(2) the spiral exact sequence (Sections 3.1, 3.2 of our paper)

- define $\pi_*^\natural(X^\bullet, G)$ and $\pi_*[X^\bullet, G]$,
- mention 3.3 and Thm. 3.13, mention π_0-module structure

2. (Quasi-)cofree maps and cosimplicial connectivity

- *Section 3.3* define (quasi-)$\mathcal{G}$-cofree maps, mention 3.17, 3.18, 3.20, 3.21, 3.22, 3.26, 3.27
- *Section 3.4* about cosimplicial connectivity, mention 3.28, 3.29, 3.30, as example page 32 explain what is an n-connected map in $c\mathcal{CA}^{\mathcal{E}}$, 4.16, page 46 n-connected map in $c\mathcal{S}^{\mathcal{G}}$

For the main seminar:

Talk 1: Objects of type $K(C, 0)$ and $K_C(M, n)$ and skeletal filtration in $c\mathcal{CA}$

Section 4.5: Definition of objects of type $K(C, 0)$ and $K_C(M, n)$, their moduli spaces 4.26, 4.27, corepresenting property Thm 4.17

Section 4.6: Prop. 4.29, the skeletal filtration, Prop. 4.30 (moduli space of "adding something in degree n")

Talk 2: Objects of type $L(C, 0)$ and $L_C(M, n)$ and skeletal filtration in $c\mathcal{S}$

Section 5.3: Definition of objects of type $L(C, 0)$ and $L_C(M, n)$ and various equivalent ways (π_0-module structure of the SES enters in 5.18), construction 5.20, Prop. 5.24 relation to $K_C(M, n)$, Cor. 5.27, their moduli spaces in 5.28/5.29 (maybe without proofs)

Section 5.4: the skeletal filtration (this is the essential application of homotopy excision!), the fundamental homotopy pushout square Prop 5.30

Talk 3: Potential n-stages and the realization space

Compute $\pi_*^\natural(\mathrm{sk}_{n+1}\, cX, G)$ and $\pi_*[\mathrm{sk}_{n+1}\, cX, G]$ for a space X, then give Def. 6.2 of potential n-stages

Section 6.1: fundamental homotopy pushout for pot. n-stages Thm 6.4

Section 6.2: Thm 6.13, Cor. 6.15, mention Thm 6.11 (if time and energy permit, give some ideas of the proof)

Talk 4: More moduli spaces and obstructions (Georg)

Section 6.2: Thm. 6.6, 6.8, framed moduli spaces, obstructions

More useful literature around the matter: [4], [2], [7], [1], [5], and of course [8] and [9]

References

[1] D. Blanc. Realizing coalgebras over the Steenrod algebra. *Topology*, 40(5):993–1016, 2001.

[2] D. Blanc, W. Dwyer, and P. Goerss. The realization space of a Π-algebra: a moduli problem in algebraic topology. *Topology*, 43:857–892, 2004.

[3] A. Bousfield. Cosimplicial resolutions and homotopy spectral sequences in model categories. *Geometry and Topology*, 7:1001–1053, 2003.

[4] A. K. Bousfield. Homotogy spectral sequences and obstructions. *Israel. J. Math.*, 66(1-3):54–104, 1989.

[5] W. Dwyer, D. Kan, and C. Stover. The bigraded homotopy groups $\pi_{i,j}X$ of a pointed simplicial space. *Journal of Pure and Applied Algebra*, 103:167–188, 1995.

[6] W. G. Dwyer, D. M. Kan, and C. R. Stover. An E^2 model category structure for pointed simplicial spaces. *J. Pure Appl. Algebra*, 90(2):137–152, 1993.

[7] P. Goerss and M. Hopkins. Moduli problems for structured ring spectra. `http://www.math.northwestern.edu/ pgoerss/`.

[8] D. Quillen. Homology of commutative rings. unpublished, `http://en.wikipedia.org/wiki/Daniel_Quillen`.

[9] D. G. Quillen. *Homotopical algebra.* Lecture Notes in Mathematics, No. 43. Springer-Verlag, Berlin, 1967.