Prof. Dr. Ulrich Bunke

Universität Regensburg

WS 2022/23

Noncommutative Homotopy theory II

Exercise 8

hand in until: 10.07.2023

Exercise 1. Extend the construction of the Kasparov projection to possibly non-unimodular groups.

Exercise 2. Let G be a discrete group and H be a subgroup. Construct an equivalence of slice categories $BH \simeq G\mathrm{Orb}_{/(G/H)}$.

Exercise 3. Consider the group G of homeomorphisms of $\mathbb{R}$ generated by the translation group $\mathbb{Z}$ and the reflection at 0. Show that the G-space $\mathbb{R}$ is a model for $E_{\mathcal{F}in}G$.

Exercise 4. Let G be a finite group and $\mathcal{P}rop$ be the family of proper subgroups. Let $V \subseteq L^2(G, \mathbb{R})$ be the orthogonal complement of the constant functions. Let $E_n := S(\bigoplus_{i=1}^n V)$ be the unit sphere in the n-fold sum of V with the induced G-action. Show that $\mathrm{colim}_{n\in\mathbb{N}} E_n \simeq E_{\mathcal{P}rop}G$, where the structure maps are induced by the canonical inclusions $\bigoplus_{i=1}^n V \to \bigoplus_{i=1}^{n+1} V$.