Report on the visit of Karin Baur to NTNU in June 2022

In June 2022 I visited NTNU to start a new project with Aslak Bakke Buan on a geometric realisation of TF ordered (τ-) tilting modules. (TF stands for torsion/torsion free). At the beginning of my visit I attended the conference in honor of Øyvind Solberg's 60th birthday where I reported on work on skew group categories and how geometry on surfaces with orbifolds can be used to describe algebras and tilting objects. It allowed me to interact with Sibylle Schroll and attend talks by her and by Jan Stovicek about exceptional sequences for the derived category of a gentle algebra. Gentle algebras can be characterised via tilings of surfaces by work of Opper-Plamondon-Schroll and by work of mine with Coelho Simoes.

Buan and Marsh and Mendoza and Treffinger, independently, have shown in recent work that there exists a bijection between τ-exceptional sequences and TF-ordered τ-tilting objects, for finite dimensional algebras. In our work in June, we considered algebras in type A and in type $\widetilde{A}$. In the hereditary cases, we can use the fact that τ-exceptional sequences and exceptional sequences in the module category agree. We are also interested in non-hereditary cases where the geometrical conditions become more intricate. In our work, we looked at the TF ordering condition in relation with the geometric description of indecomposable objects. In particular, we were interested in giving a geometry characterisation of the condition that an indecomposable summand is not generated by the sum of all previous summands. This involves understanding spaces of homomorphisms between string modules in the surface geometry.