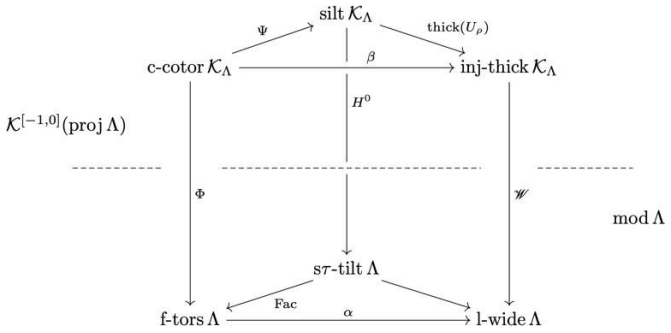
Annual Highlights 2023
DNRF Chair Peter Jørgensen, Aarhus University

The DNRF Chair experienced some staff changes in 2023. Jenny August obtained a position at the University of Glasgow and left Aarhus at the end of February. Nicola Bellumat's postdoc position ended on 31 August, and he was replaced by Karin Jacobsen. Raphael Bennett-Tennenhaus (postdoc) and Anders Kortegaard (PhD student) were members of the Chair throughout 2023.

The DNRF Chair remains part of the vibrant Aarhus Homological Algebra Group, which comprises two more postdocs (Esther Banaian and Amit Shah) and two more PhD students (Carlo Klapproth and David Nkansah) supported by the AUFF and the IRFD.

The highlights of 2023 were the Special Sessions "Homological Algebra" and "Representation Theory and Combinatorics" of the 29th Nordic Congress of Mathematicians, which took place 3-7 July in Aalborg. The Special Sessions were co-organised by members of the DNRF Chair and attracted a total of 18 speakers from top universities around the world, including Bonn and Paris.



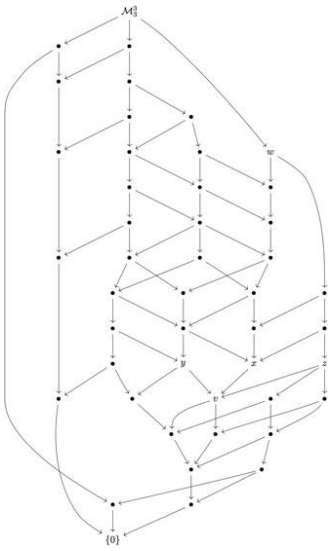
Monica Garcia from Université Paris-Saclay gave a talk at the Special Session "Homological Algebra" of the 29th Nordic Congress of Mathematicians. She spoke about new properties of the category of 2-term complexes of projective modules, a key object of contemporary algebra.

We had 14 seminars and continued the tradition of hosting two symposia per year, each with three speakers. Almost all speakers were international. Seminars and symposia were typically followed by social events, which also provided a venue for interaction with the invited speakers.

A total of four papers and six preprints were published in 2023 by members of the DNRF Chair. The paper "Cluster structures for the A_∞ singularity" by Jenny August et al. appeared in the Journal of the London Mathematical Society, and the paper "The category of extensions and a characterisation of *n*-exangulated functors" by Raphael Bennett-Tennenhaus et al. appeared in Mathematische Zeitschrift, both leading international journals.

The preprint "A characterisation of higher torsion classes" by Jenny August, Karin Jacobsen et al. established a number of particularly promising results. Classic homological algebra concerns two dimensional structures. In the last decades, it has been generalised to higher dimensions in the form of so-called higher homological algebra. Torsion classes, a key notion of classic homological algebra, were generalised to the higher situation some ten years ago but have so far been poorly understood.

However, the preprint by August, Jacobsen et al. provided a range of new methods for higher homological algebra, not least a form of factorisation through the image. These methods enabled the authors to find an alternative way to define higher torsion classes, dramatically increasing the supply of computable examples. For instance, they were able to compute the full Hasse diagrams of higher torsion classes in several concrete cases.



A Hasse diagram of higher torsion classes.