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Tilting modules, fans and group actions with a dense orbits

TIME:
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LOCATION:

To any finite dimensional algebra A of finite global dimension we associate a fan in the Grothendieck group of the category of finite dimensional A-modules. We prove several properties of this fan, in particular it is smooth and purely t-dimensional, where t is the rank of the Grothendieck group. Moreover, the cones of maximal dimension correspond to tilting modules of projective dimension at most one. As a first application we consider certain actions of algebraic groups related to the category of A-modules. Then it turns out that tilting modules correspond to actions with a dense orbit. Thus the fan classifies for those actions all instances admitting a dense orbit, and, in addition, defines representatives of the dense orbit. In a second application we consider actions of parabolic subgroups in a general linear group on ideals in the Lie algebra of the unipotent radical. It is convenient to fix the shape of the ideal and the number t of blocks of the parabolic group. Then we consider all those parabolic groups P(d) (where d = (d_1,...,d_t) denotes the block size) acting on the corresponding ideal n(d) for all possible dimension vectors d simultaneously. We define the set D(t) to be the set of all d, so that P(d) acts with a dense orbit on n(d). Then the set D(t) is the set of lattice points in a fan.

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