Monomial Ideals and Toric Rings Associated with Isotone Maps between Posets

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In 1987, Hibi introduced toric rings associated with a distributive lattice which nowadays are called Hibi rings. Hibi rings appear in various combinatorial and algebraic contexts. For example, the coordinate ring of a flag variety for GLn is a flat deformation of the Hibi ring on a certain poset known as the Gelfand-Tsetlin poset.

In this lecture we present a far reaching generalization of Hibi ideals and Hibi rings. A first generalization was considered in my joint paper with Ene and Mohammadi. Inspired by this, monomial ideals associated with isotone maps were introduced in a joint paper with Greve and Fløystad and further studied in a paper a joint paper with Shíkama and Qureshi as well as in a paper by Juhnke-Kubitzke, Katthän and Saeedi Madani.

In this lecture we survey these results and also discuss the new class of toric rings arising in this context.