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Weak order on groups generated by involutions

An involution system (W,S), that is a group W generated by a set of involutions S, is naturally endowed with a weak order arising from orienting its Cayley graph. If (W,S) is a Coxeter system, Björner showed that the weak order is a complete meet-semilattice. This fact has many important consequences for Coxeter systems and their related structures. In this talk, we discuss the following question: For which involution systems is the weak order a complete meet-semilattice? The class of involution systems that satisfies this condition is larger than the class of Coxeter systems (it contains, for instance, Cactus groups). In the case of an involution system with sign character, we provide a finite presentation by generators and relations and a classification in rank 3. If time allows, we will also discuss open problems (e.g. in relation to automatic structures, geometric representations, CAT(0) cell complexes, ...). Joint work with Christophe Hohlweg and Fabricio Dos Santos.