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**Patricia Hersh\*** (plhersh@ncsu.edu) and **Cristian Lenart**. *From the weak Bruhat order to crystal graphs as posets.*

Crystal graphs give a combinatorial approach to studying the representation theory of Kac-Moody algebras. These graphs are partially ordered sets in many important cases, for instance the case of crystals representing the highest weight representations in finite type. We prove that fundamental properties of the weak Bruhat order transfer to lower intervals in these crystal posets, but that even in type A these properties do not always hold for arbitrary intervals. For lower intervals we prove a crystal theoretic analogue of the statement that any two reduced expressions for the same Coxeter group element are connected by a series of braid moves, and we prove that the Moebius function only takes the values 0,1,-1. Our negative results for arbitrary intervals imply that there are relations of arbitrarily high degree amongst the crystal operators that are not implied by any lower degree relations. We will also discuss the role of the key of a crystal, a generalization of the key polynomials which arose in work of Lascoux and Schutzenberger on Schubert polynomials, in this story. We will not assume previous familiarity with crystals or crystal operators in this talk. (Received July 14, 2016)