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SCHUR POSITIVITY OF CHROMATIC SYMMETRIC FUNCTIONS OF DISTRIBUTIVE LATTICES

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In 1998, R.P. Stanley posed an open problem asking whether the incomparability graph of any distributive lattice is Schur positive, motivated by a conjecture due to Griggs concerning boolean algebras. A Schur positive graph is known to satisfy a combinatorial "nice" property. In this extended abstract, we present a negative answer to this conjecture. We construct a family of distributive lattices that are not nice and hence not Schur positive. Furthermore, we investigate the product of chains, demonstrating that even nice distributive lattices are generically not Schur positive.

Joint work with Grace M.X. Li, Arthur L.B. Yang, and Zhong-Xue Zhang.