Gabor frames with totally positive windows

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Gabor frames are sets of time-frequency shifts of a single (window) function that generate a dense subspace of L^2 and enable stable series expansions. For a fixed window it is in general difficult to determine all lattices that generate a Gabor frame. In this context the class of totally positive functions is very special, because they admit a complete characterization of all Gabor frames over a rectangular lattice. In this talk I will explain the role of total positivity and the invertibility of totally positive matrices for the problem of Gabor frames. The study of Gabor frames leads to several new questions about totally positive functions and associated infinite totally positive matrices that may be of general interest.