1064-05-164   **Thomas Lam** and **Pavlo Pylyavskyy*** (`pylyavskyy@gmail.com`). *Crystals and total positivity on orientable surfaces.*

We develop a combinatorial model of networks on orientable surfaces, and study weight and homology generating functions of paths and cycles in these networks. Network transformations preserving these generating functions are investigated. We describe in terms of our model the crystal structure and R-matrix of the affine geometric crystal of products of symmetric and dual symmetric powers of type A. Local realizations of the R-matrix and crystal actions are used to construct a double affine geometric crystal on a torus, generalizing the commutation result of Kajiwara-Noumi-Yamada and an observation of Berenstein-Kazhdan. We show that our model on a cylinder gives a decomposition and parametrization of the totally nonnegative part of the rational unipotent loop group of GL_n. (Received September 07, 2010)