1047-05-181 **Michael Gekhtman*** (mgekhtma@nd.edu), Department of Mathematics, University of Notre Dame, Notre Dame, IN 46530, and **Michael Shapiro** and **Alek Vainshtein**. *Poisson Geometry of Directed Networks.*

Recently, Postnikov used weighted directed planar graphs in a disk to parametrize cells in Grassmannians. We investigate Poisson properties of Postnikov's map from the space of edge weights of a planar directed network into the Grassmannian. We show that this map is Poisson if the space of edge weights is equipped with a representative of a 6-parameter family of universal quadratic Poisson brackets and the Grasmannian is viewed as a Poisson homogeneous space of the general linear group equipped with an appropriately chosen R-matrix Poisson-Lie structure. We also prove that Poisson brackets on the Grassmannian arising in this way are compatible with the natural cluster algebra structure.

Next, we generalize Postnikov's construction by defining a map from the space of edge weights of a directed network in an annulus into a space of loops in the Grassmannian. We then show that universal Poisson brackets induce a family of Poisson structures on rational-valued matrix functions and on the space of loops in the Grassmannian. In the former case, this family includes, for a particular kind of networks, the Poisson bracket associated with the trigonometric R-matrix. (Received January 28, 2009)