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Ivan E. Horozov* (horozov@math.wustl.edu), Washington University in t. Louis, One Brookings Dr., Campus Box 1146, Saint Louis, MO 63130. *Reciprocity Laws on Algebraic Surfaces via Iterated Integrals.*

In this talk we will introduce new local symbols, which we call 4-function local symbols. We formulate reciprocity laws for them. These reciprocity laws are proven using a new method - multidimensional iterated integrals. Besides providing reciprocity laws for the new 4-function local symbols, the same method works for proving reciprocity laws for the Parshin symbol. Both the new 4-function local symbols and the Parshin symbol can be expressed as a finite product of newly defined bi-local symbols, each of which satisfies a reciprocity law. The K-theoretic variant of the first 4-function local symbol will be defined. It differs by a sign from the one defined via iterated integrals. Both the sign and the K-theoretic variant of the 4-function local symbol satisfy reciprocity laws, whose proof is based on Milnor K-theory. The relation of the 4-function local symbols to the double free loop space of the surface (the space of maps from a torus to the surface) is given by iterated integrals over membranes. (Received July 05, 2014)