1037-22-252 **Leonard Gross*** (gross@math.cornell.edu), Department of Mathematics, Cornell University, Ithaca, NY 14853, and **Maria Gordina** (gordina@math.uconn.edu) and **S. G. Rajeev** (sgrajeev@gmail.com). *Group elements in tensor algebras.*

The tensor algebra, T, over a finite dimensional Lie algebra, g is contained in a natural Frechet completion, F, which is also an algebra under tensor multiplication. This is Driver's Frechet algebra. The exponential power series of an integrable function from [0,1] into g exists in F and the set of such exponentials is a group, E, contained in F. If G is a simply connected, connected Lie group with Lie algebra g then the velocity field of any absolutely continuous path into G is such an integrable function into g. Moreover the velocity fields of closed loops in G can be characterized intrinsically by means of the two sided ideal, J, in F generated by the Lie bracket operation. It will be proved that the group E, modulo the subgroup of closed loops and modulo reparametrizations, is isomorphic to G itself. Our goal is to reconstruct G from the tensor algebra over g in such a way as to facilitate study of heat kernel measures on infinite dimensional groups. Lie's third theorem in global form also comes out of our methods, which are somewhat in the spirit of Duistermaat and Kolk (2000). (Received February 04, 2008)