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**Arkady Berenstein** (arkadiy@math.uoregon.edu) and **Jacob Greenstein\***  
(jacob.greenstein@ucr.edu). *Topological Hall algebras and exponentials in  
categories*. Preliminary report.

We define a topological Hall algebra by dropping the exactness. The resulting algebra is a deformation of the completion of the usual Hall algebra with respect to the grading by the Grothendieck group, and its associativity leads to rather non-trivial  $q$ -binomial identities. To establish the existence of an integral isomorphism of the topological Hall algebra onto the completion of the Hall algebra, one needs to introduce exponentials of categories and study their factorizations. In particular, this yields non-commutative generating functions for Grassmanians in categories, as well as interesting  $q$ -exponential identities. (Received September 22, 2011)