William M. Singer* (singer@fordham.edu), Department of Mathematics, Fordham University, Bronx, NY 10458. Rings of Symmetric Functions as Algebras over the Steenrod Algebra.

We write $P^\otimes_s$ for the polynomial ring on $s$ letters over the field $\mathbb{Z}/2$, equipped with the standard action of $\Sigma_s$, the symmetric group on $s$ letters. This paper deals with the problem of determining a minimal set of generators for the invariant ring $(P^\otimes_s)^{\Sigma_s}$ as a module over the Steenrod algebra $A$. That is, we would like to determine the graded vector spaces $\mathbb{Z}/2 \otimes_A (P^\otimes_s)^{\Sigma_s}$. Our main result is stated in terms of a “bigraded Steenrod algebra” $H$. The generators of this algebra $H$, like the generators of the classical Steenrod algebra $A$, satisfy the Adem relations in their usual form. However, the Adem relations for the bigraded Steenrod algebra are interpreted so that $Sq^0$ is not the unit of the algebra; but rather, an independent generator. Our main work is to assemble the duals of the vector spaces $\mathbb{Z}/2 \otimes_A (P^\otimes_s)^{\Sigma_s}$, for all $s \geq 0$, into a single bigraded vector space; and to show that this bigraded object has the structure of an algebra over $H$. (Received August 14, 2008)