1035-55-1555 **Courtney K. Taylor*** (ctaylor@math.purdue.edu), Department of Mathematics, Purdue University, 150 N. University Street, West Lafayette, IN 47907-2067. *Using Unstable Modules over the Steenrod Algebra to Obtain $H^*(X^{S^1};R)$ from $H^*_{S^1}(X;R)$.* Preliminary report.

Dwyer and Wilkerson have shown that given an elementary abelian p-group G, and X a finite G-CW-complex, there is an algorithmic way to obtain the mod p cohomology of the fixed point set X^G from the Borel cohomology of X, $H^*_G(X;F_p)$. More specifically, let S the multiplicative set generated by the elements of $H^2(BG;F_p)$ that are nontrivial images under the Bockstein. Also, for any module M over the Steenrod algebra, $\mathcal{A}_p$, let UnM denote the submodule of M that is unstable over $\mathcal{A}_p$. Then the following is an isomorphism of unstable $\mathcal{A}_p - H^*(BG;F_p)$-modules,

$$H^*(X^G;F_p)\cong F_p \bigotimes_{H^*(BG;F_p)} UnS^{-1}H^*_G(X;F_p)$$

The goal of this talk is to show that a similar isomorphism exists for a finite S^1-CW complex with a finite number of isotropy types. Let R be a subring of $\mathbb{Q}$ with almost all primes $p \in \mathbb{Z}$ noninverted. Since there is no action of $\mathcal{A}_p$ on $H^*_{S^1}(X;R)$, the strategy employed is to work mod p. This is done for almost every prime and a version of the Un functor is defined in this setting. (Received September 20, 2007)