Abstract: Non-commutative Hodge theory is the study of Hodge structures on the cyclic homology groups of dg-categories $\mathcal{C}$. In this talk, we will study the case $\mathcal{C} = D^b\text{Coh}(X/G)$, where $X$ is a quasi-projective variety and $G$ is an algebraic group. Using Halpern-Leistner’s theory of derived Kirwan surjectivity, we prove the collapse of nc Hodge-to-de Rham spectral sequence in variety of situations for example when $X$ is smooth, $G$ is reductive and $\Gamma(X, \mathcal{O}_X)^G$ is finite dimensional. These results on the degeneration of the spectral sequence also extend to categories of singularities.

Using homotopy theoretic methods, there is a Chern character from a topological version of algebraic K-theory to this periodic cyclic homology. We show that this map is an isomorphism, thereby putting an integral structure and ultimately a weight zero Hodge structure on the periodic cyclic homology. Along the way, we identify the periodic cyclic homology with a complexified version of equivariant K-homology in the sense of Atiyah and Segal. This is joint work with Dan Halpern-Leistner.