On the integral cohomology of orbifolds

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A variety of tools, including specialized cohomology theories, have been crafted in recent years to study orbifolds arising in a variety of different areas of topology and geometry, [1], [2] and [3]. Strangely enough however, the singular integral cohomology ring remains somewhat intractable in most cases.

The example of weighted projective space, does succumb to the traditional methods of algebraic topology, [5]. Additively, its cohomology agrees with that for ordinary projective space but the ring structure is saturated with divisibility arising from the weights. Essential to the computation is the observation that weighted projective spaces can be constructed by a sequence of canonical cofibrations, in a manner not unlike that for CW complexes.

Motivated by this, we identify classes of orbifolds which can be built in this way using "orbifold cells" or "**q**-cells". Some of these ideas, originated by Goresky in [4], were developed in a toric framework, by Poddar and Sarkar in [7], though our results are not restricted to *toric* orbifolds.

We derive conditions on the **q**-cell structure of an orbifold which ensure that the integral cohomology is free of torsion

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and concentrated in even degree. In particular, the toric setting allows for a translation into conditions on the fan or characteristic map, which suffice for a complete calculation of the integral cohomology rings. The constructions in [6] allow for an extension of the results to *torus* orbifolds as well.

References

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