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Free, proper and cellular actions of discrete groups on homotopy circles

Let $G \times \Sigma(1) \rightarrow \Sigma(1)$ be a free, proper and cellular action of a group G on a finite dimensional CW -complex $\Sigma(1)$ that has the homotopy type of the circle. We determine all virtually cyclic groups G that act on $\Sigma(1)$ together with the induced action $G \rightarrow \text{Aut}(H^1(\Sigma(1), \mathbb{Z}))$, and we classify the orbit spaces $\Sigma(1)/G$.

This is a joint work with M. Golasinski and D. Goncalves.