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**Integral cohomology rings of four-dimensional
toric orbifolds**

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Toric orbifolds introduced by Davis and Januszkiewicz are topological analogs of projective toric varieties. When a toric orbifold is smooth, its integral cohomology ring is isomorphic to a quotient ring of the Stanley-Reisner ring. Such a formula holds for the singular case over rational coefficients, but integrally it becomes more complicated and only a few cases are known. For instance, the cohomology of a weighted projective space is additively isomorphic to the cohomology of a complex projective space, but the ring structure differs. In this talk, we focus on four-dimensional toric orbifolds X . If X has a smooth fixed point, we construct a basis for its integral cohomology and present their cup products in a matrix whose entries are explicitly determined by the characteristic function. This is joint work with Tseleung So and Jongbaek Song.