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*Satellite operators as group actions on knot concordance.*

Any knot in a solid torus (called a satellite operator) acts on knots in 3-space. We introduce a generalization of satellite operators which act on knots in homology 3-spheres. Unlike traditional satellite operators, these generalized operators form a group, modulo an appropriate generalization of concordance. By studying the action of this group on knots in homology 3-spheres we recover the very recent result of Cochran-Davis-Ray that satellite operators with strong winding number one give injective functions on smooth knot concordance in  $S^3 \times [0,1]$ , modulo the smooth 4-dimensional Poincare Conjecture. We also describe how the notion of generalized satellite operators provides a new framework within which to consider the question of surjectivity of satellite operators and make some progress towards answering this question. We also construct a new example of a bijective satellite operator. (Received August 27, 2013)