1115-05-347 **Federico Ardila***, 1600 Holloway Ave., San Francisco, CA 94132. *Moving robots efficiently using the combinatorics of CAT(0) cubical complexes.*

Given a reconfigurable system X, such as a robot moving on a grid or a set of particles traversing a graph without colliding, the possible positions of X naturally form a cubical complex S(X). When S(X) is CAT(0), we can explicitly construct the shortest path between any two points, for any of the four most natural metrics: distance, time, number of moves, and number of steps of simultaneous moves. In earlier work we showed that CAT(0) cubical complexes are in correspondence with posets with inconsistent pairs (PIPs), so we can prove that a state complex S(X) is CAT(0) by identifying the corresponding PIP. We illustrate this very general strategy with one known and one new example: Abrams and Ghrist's positive robotic arm on a square grid, and the robotic arm in a strip. We then use the PIP as a combinatorial "remote control" to move these robots efficiently from one position to another. This talk is based on joint work with Tia Baker, Hanner Bastidas, César Ceballos, John Guo, and Rika Yatchak. It will assume no previous knowledge of the subject. (Received September 22, 2015)