Figure 8.7  Global localization in an office environment using sonar data. (a) Path of the robot.  (b) Belief as the robot passes position 1.  (c) After some meters of robot motion, the robot knows that it is in the corridor.  (d) As the robot reaches position 3 it has scanned the end of the corridor with its sonar sensors and hence the distribution is concentrated on two local maxima.  While the maximum labeled I represents the true location of the robot, the second maximum arises due to the symmetry of the corridor (position II is rotated by 180° relative to position I).  (e) After moving through Room A, the probability of being at the correct position I is now higher than the probability of being at position II.  (f) Finally the robot’s belief is centered on the correct pose.