SUMMARY BAYES LOCALIZATION FILTER:

$$bel(x_t) = p(x_t|z_t, z_{1:t-1}, u_{1:t}, m) = \eta\, p(z_t|x_t, z_{1:t-1}, u_{1:t}, m) \times p(x_t|z_{1:t-1}, u_{1:t}, m)$$

OBSERVATION MODEL

$$p(z_t|x_t, z_{1:t-1}, u_{1:t}, m) = p(z_t|x_t, m)$$

MOTION MODEL

$$p(x_t|z_{1:t-1}, u_{1:t}, m) = \int p(x_t|x_{t-1}, u_t, m)\, bel(x_{t-1})\, dx_{t-1}$$

$$bel(x_t) = p(x_t|z_t, z_{1:t-1}, u_{1:t}, m) = \eta p(z_t|x_t, m) \int p(x_t|x_{t-1}, u_t, m)\, bel(x_{t-1})\, dx_{t-1}$$

BAYES FILTER FOR LOCALIZATION (MARKOV LOCALIZATION)

$$bel(x_t) = p(x_t|z_t, z_{1:t-1}, u_{1:t}, m) = \eta p(z_t|x_t, m)\, \widehat{bel}(x_t)$$