Posterior PDF of the
Full-SLAM problem

Represented with particles

$$p\left(X_{1:t},\,\mathrm{Map}\;|\;Z_{1:t},\,U_{1:t}\right) = p\left(\mathrm{Map}\;|\;X_{1:t},\,Z_{1:t},\,U_{1:t}\right)\,p\left(X_{1:t}\;|\;Z_{1:t},\,U_{1:t}\right)$$

Entire path

$$= \left(\prod_{j=1}^{N} p\left(\vec{p}_{W\,j}\,|\;X_{1:t},\,Z_{1:t}\right)\right)\,p\left(X_{1:t}\;|\;Z_{1:t},\,U_{1:t}\right)$$

$$X_{1:t} = \{\vec{x}_1,\,\vec{x}_2,\,\ldots,\,\ldots,\,\vec{x}_{t-1},\,\vec{x}_t\}$$

Conditional independence:
If the path $X_{1:t}$ is known, then the
positions of the landmarks are independent!

PDF of the landmark position given
the entire path and all the measurements

$$\vec{p}_{W\,j} = \begin{pmatrix} x_{W\,j} \\ y_{W\,j} \end{pmatrix}, \quad j = 1,\,\ldots,\,N$$

The PDF $p\left(\vec{p}_{W\,j}\,|\;X_{1:t},\,Z_{1:t}\right)$ is represented as a Gaussian PDF.

An independent EKF is used
for each registered world landmark