$$rac{p(oldsymbol{ ext{osterior}}}{p(oldsymbol{x}_k ig| oldsymbol{Z}_k)} = rac{p(oldsymbol{x}_k, oldsymbol{Z}_k)}{p(oldsymbol{Z}_k)} \ = rac{p(oldsymbol{z}_k, oldsymbol{Z}_{k-1})}{p(oldsymbol{z}_k, oldsymbol{Z}_{k-1})}$$

Bayes' rule $\frac{p(z_k|x_k,Z_{k-1})p(x_k,Z_{k-1})}{p(z_k|Z_{k-1})p(Z_{k-1})}$ independence, Bayes' rule $= \frac{p(z_k|x_k)p(x_k|Z_{k-1})p(Z_{k-1})}{p(z_k|Z_{k-1})p(Z_{k-1})}$

nuisance variable
$$p(z_k|Z_{k-1})p(Z_{k-1})$$

 $\int p(z_k|x_k)p(x_k|Z_{k-1})dx_k$ likelihood prior (prediction) $\propto p(z_k, x_k) p(x_k|Z_{k-1})$