

$$\begin{aligned}
 \mathbb{E}[\mathcal{L}_\lambda(\mathbf{w}_t)] &= \mathbb{E}[\mathcal{L}_\lambda(\mathbf{w}_t) | \mathcal{H}_t] = \mathbb{E}[\mathcal{L}_\lambda(\mathbf{w}_t) | \mathcal{H}_t, \mathbf{w}_t] \\
 &= \mathbb{E}[\mathcal{L}_\lambda(\mathbf{w}_t) | \mathcal{H}_t, \mathbf{w}_t, \mathbf{w}_t] = \mathbb{E}[\mathcal{L}_\lambda(\mathbf{w}_t) | \mathcal{H}_t, \mathbf{w}_t, \mathbf{w}_t] \\
 &= \mathbb{E}[\mathcal{L}_\lambda(\mathbf{w}_t) | \mathcal{H}_t, \mathbf{w}_t, \mathbf{w}_t] = \mathbb{E}[\mathcal{L}_\lambda(\mathbf{w}_t) | \mathcal{H}_t, \mathbf{w}_t, \mathbf{w}_t]
 \end{aligned}$$