



Figure for problem 7.5

The number of $TEM_{0,0,q}$ modes in that 120 GHz is $= 2 \times (120/0.75) = 320$ modes where the extra factor of two comes from the fact that there are two polarizations.

$$\text{Probability of emission into 1 mode} = \frac{320}{8.04 \times 10^9} = 3.98 \times 10^{-9}$$

This is quite small, indeed it borders on an impossibility. However, once a photon appears in any one mode with a high Q , that mode will store it for about τ_p , and then stimulated emission will add new photons into that same mode.