Starting with the expressions for the frequency of an RF cavity:

$$f = \frac{2c}{\pi}\sqrt{\frac{X^2}{R^2} + \frac{p^2\pi^2}{L^2}} \tag{1}$$

For TM modes, $X = X_{mn}$ = the n–th zero of the m-th Bessel function. [1,1]=3.83, [0,1]=2.40, [0,2]=5.52 [1,2]=7.02, [2,1]=5.14, [2,2]=8.42, [1,3]=10.17, etc. and for TE modes, $X = X'_{mn}$ = the n-th zero of the derivative of the m-th Bessel function. [0,1]=3.83, [1,1]=1.84, [2,1]=3.05, [0,2]=7.02, [1,2]=5.33, [1,3]=8.54, [0,3]=10.17, [2,2]=6.71, etc.

Rotate the dispersion relation of the cavity into Doppler frame to get the Doppler shifts, that is to say, look at the dispersion curve intersections of constant wave number instead of constant frequency.

$$df = \frac{1}{2f}\left(\frac{c}{2\pi}\right)^2 X^2 \left(\frac{1}{R_a^2} - \frac{1}{R_b^2}\right) \tag{2}$$

and from there the expression for the acceleration g from:

$$g = \frac{c^2}{L}\frac{df}{f} \tag{3}$$

such that:

$$g = \frac{c^2}{2Lf^2}\left(\frac{c}{2\pi}\right)^2 X^2 \left(\frac{1}{R_a^2} - \frac{1}{R_b^2}\right) \tag{4}$$

Using the "weight" of the photon in the accelerated frame from:

$$\text{“}W'' = \frac{hf}{c^2}g \rightarrow \text{“}W'' = T = \frac{h}{c}df \tag{5}$$

gives thrust per photon:

$$T = \frac{h}{2Lf}\left(\frac{c}{2\pi}\right)^2 X^2 \left(\frac{1}{R_a^2} - \frac{1}{R_b^2}\right) \tag{6}$$

If the number of photons is $(P/hf)(Q/2\pi f)$ then:

$$NT = \frac{PQ}{4\pi Lf^3}\left(\frac{c}{2\pi}\right)^2 X^2 \left(\frac{1}{R_a^2} - \frac{1}{R_b^2}\right) \tag{7}$$