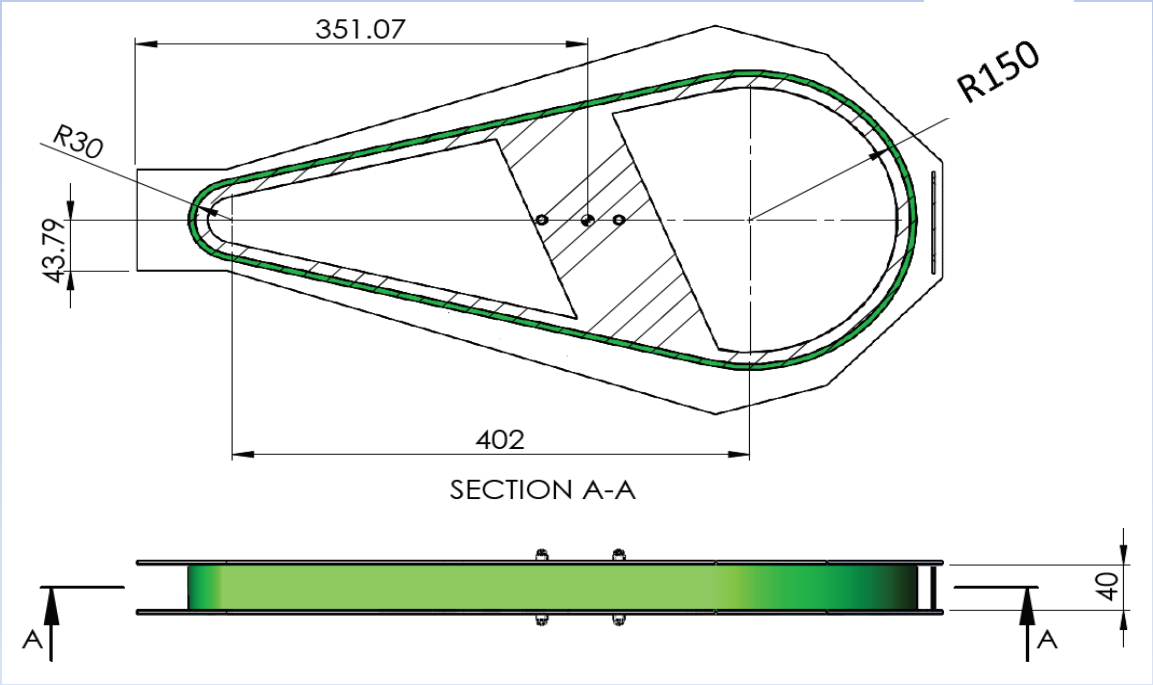
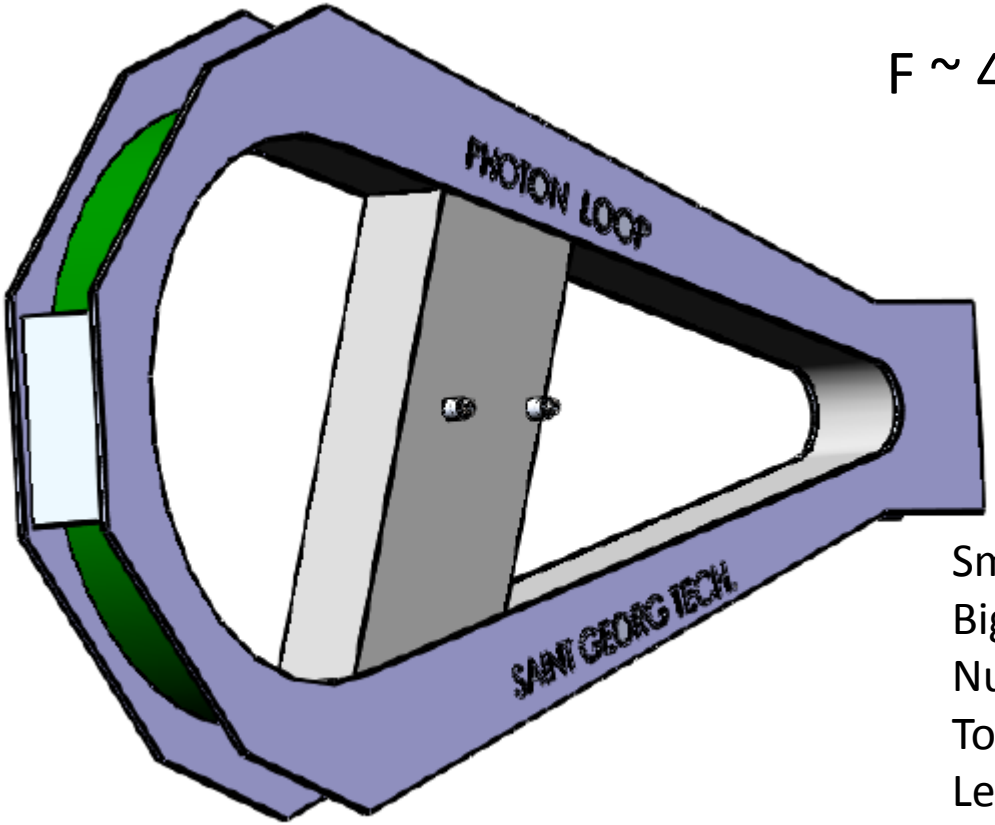
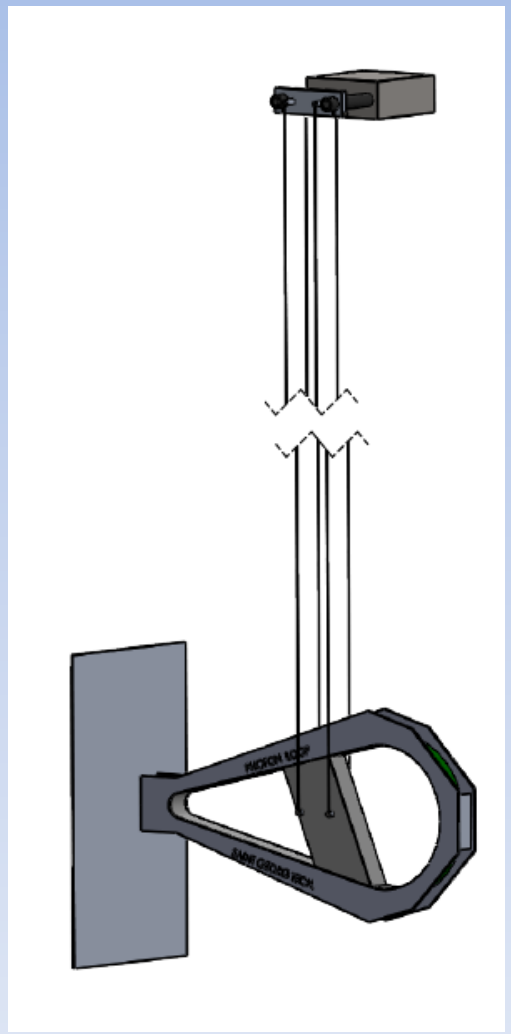
Photon-loop: a “clean” experiment

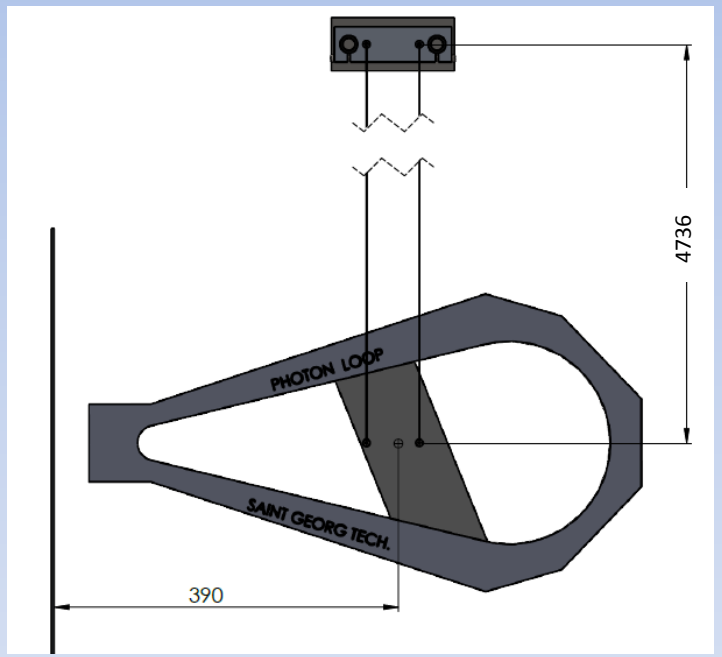




$$F \sim 4*pi*rb*PQ/c * (1/rb-1/rs)$$

Small Radius (rs): 30 mm
Big radius (rb): 150 mm
Number of turns: 2018
Total weight: 620 ±10 g
Length of threads: 4825 ±3 mm
Power of laser: 100 mW





Nominal oscillation resonance 0.2290 Hz

1 µm displacement equivalent to 1.3 µN

Q= 204.6

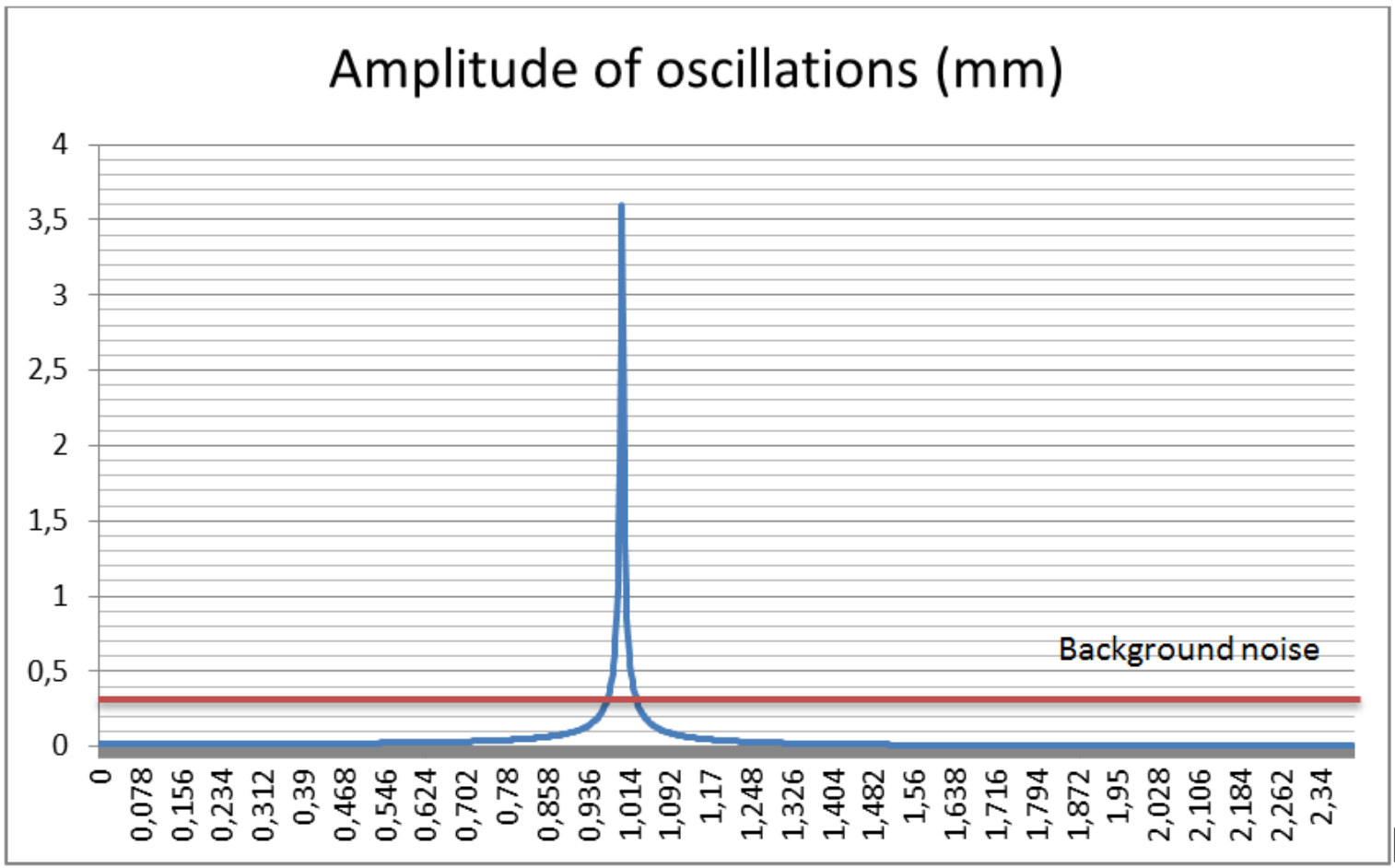
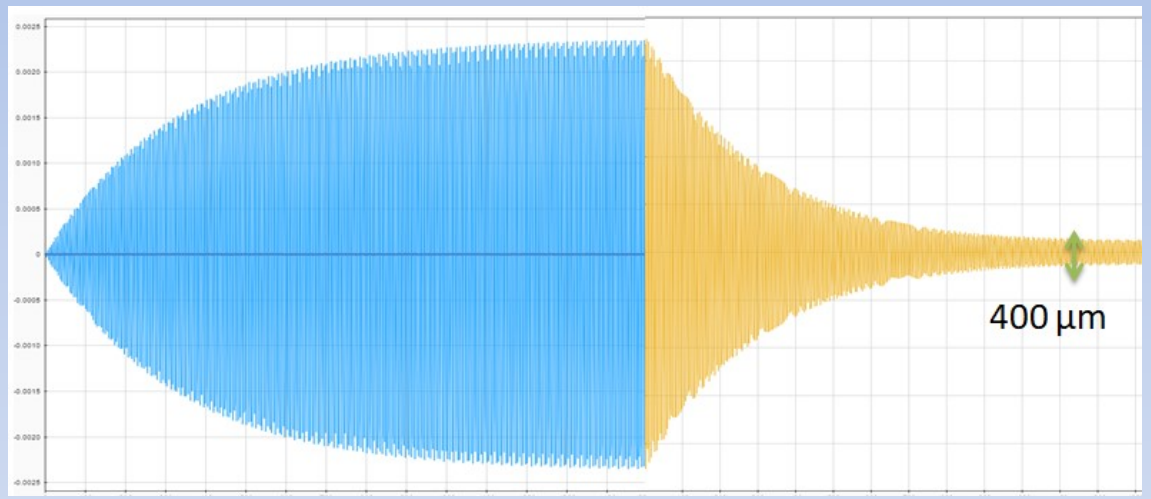
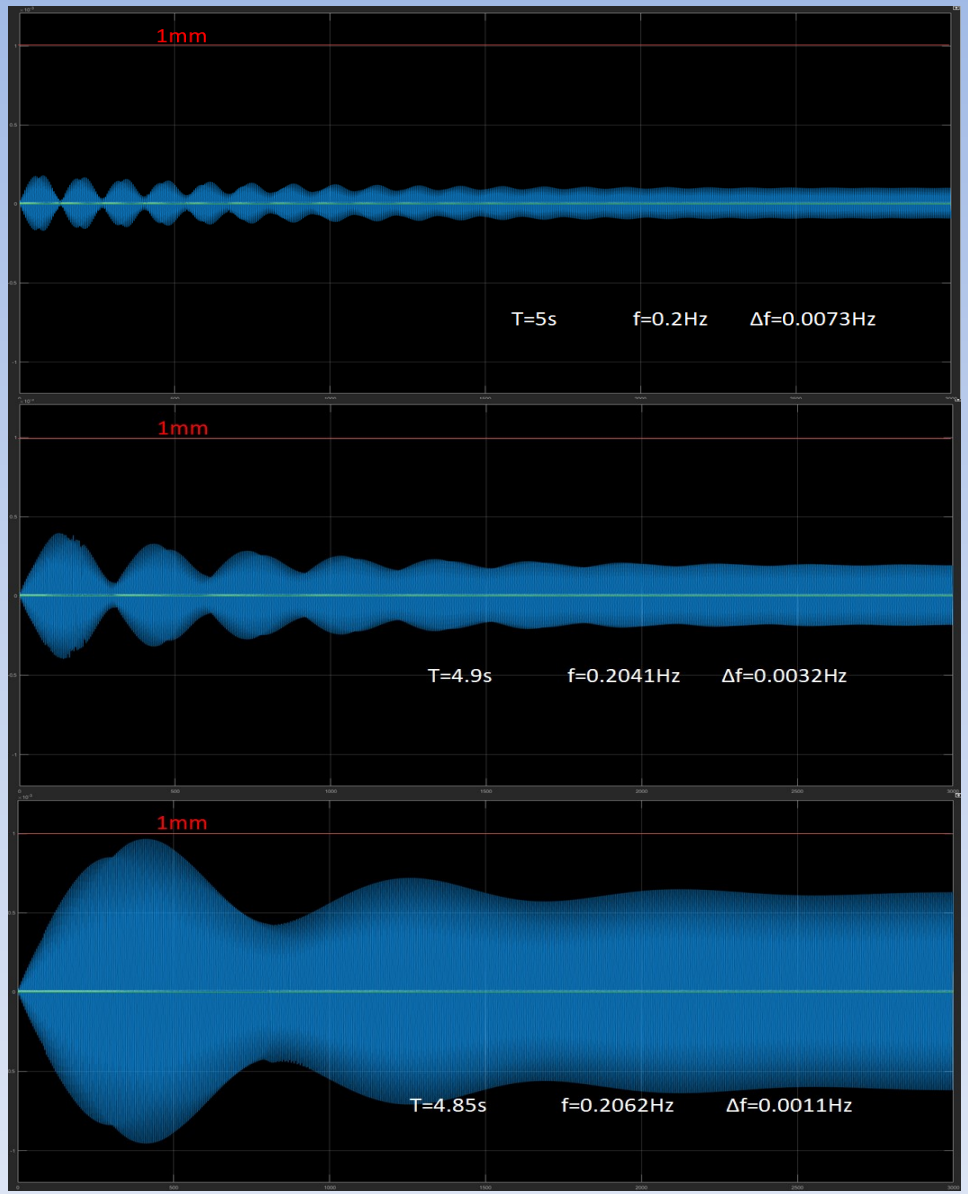
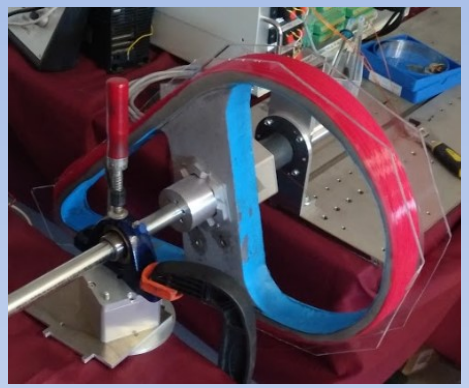
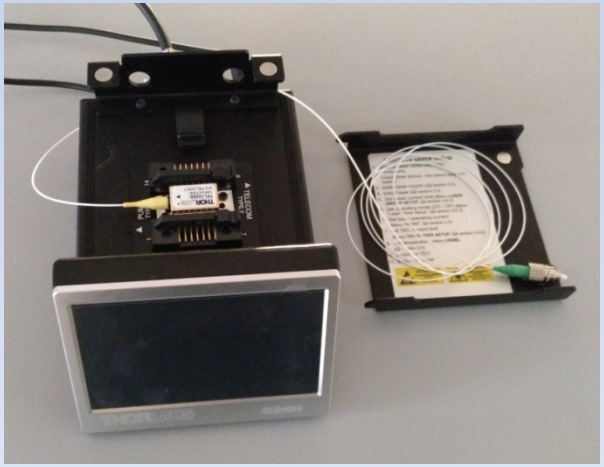


Figure 15. Plot of the amplitude of vibrations for a ratio of frequencies.

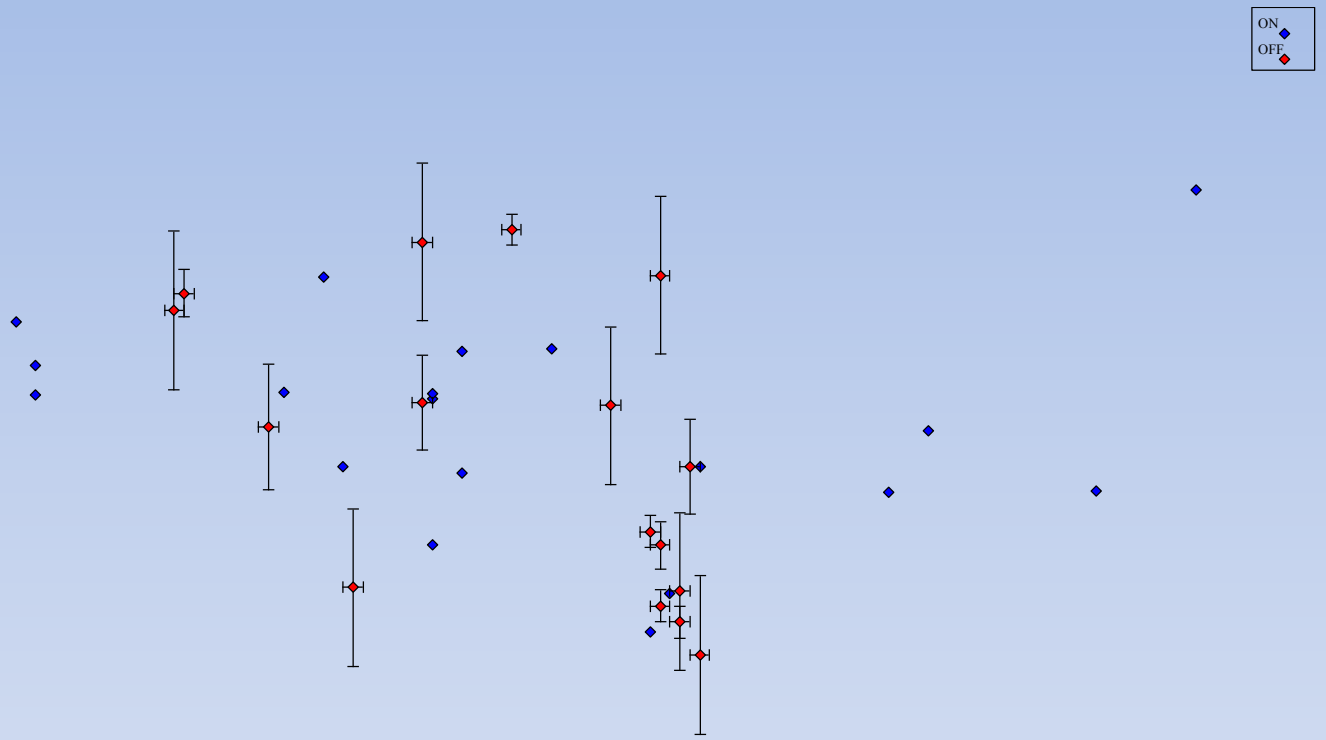

400 µm





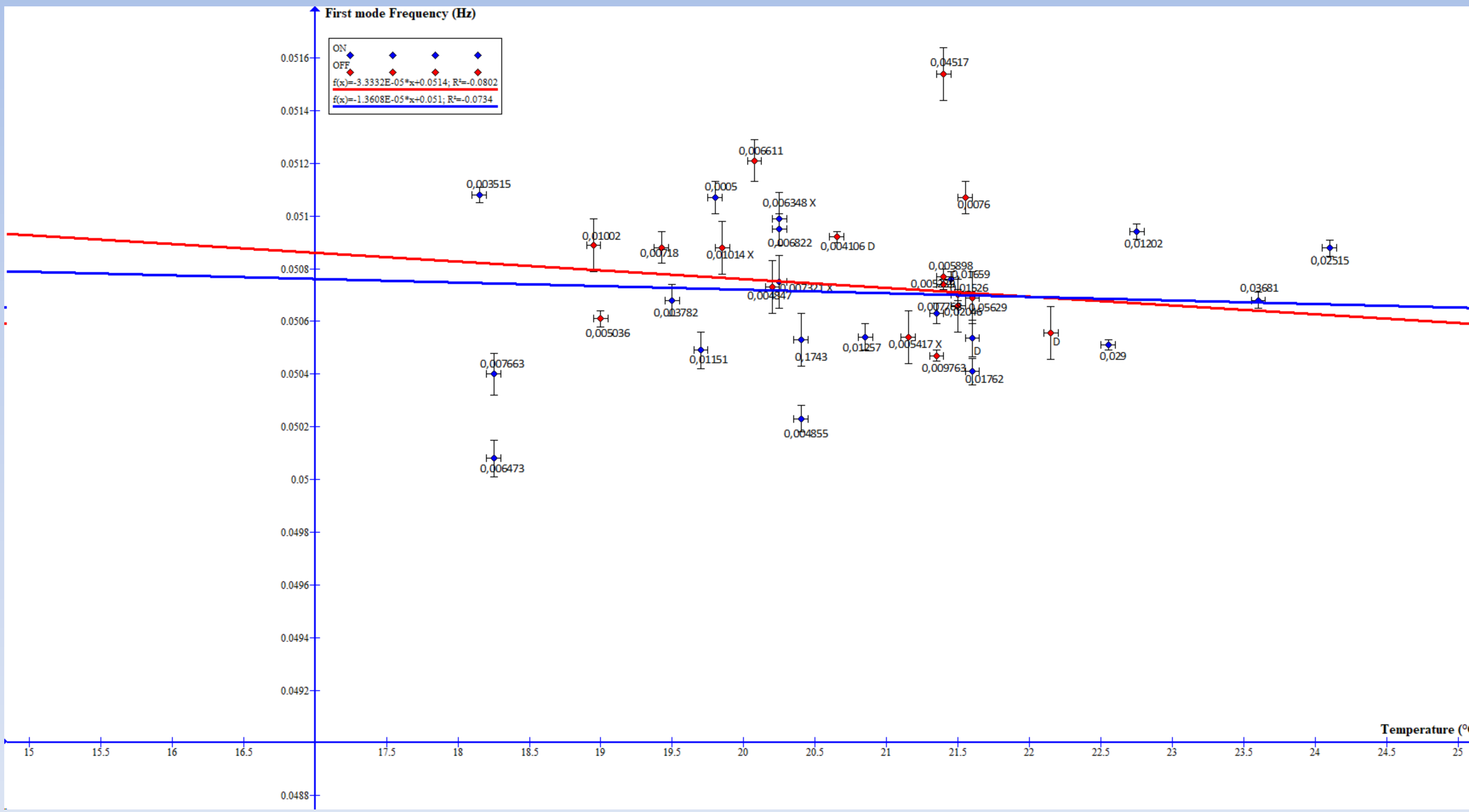



LD Current Reading
Setpoint 450.0 mA
LD Limit 470.0 mA
NR Filter ENABLED
450.2 mA
Temperature Reading
Setpoint 25.00 °C
NTC 8.198 kΩ
TEC Current 100 mA
29.51 °C
PD Current Reading
BIAS Voltage OFF
0.000 mA
LD Voltage Reading
Modulation DISABLED
1.596 V
LASER is ON
TEC is ON
MENU

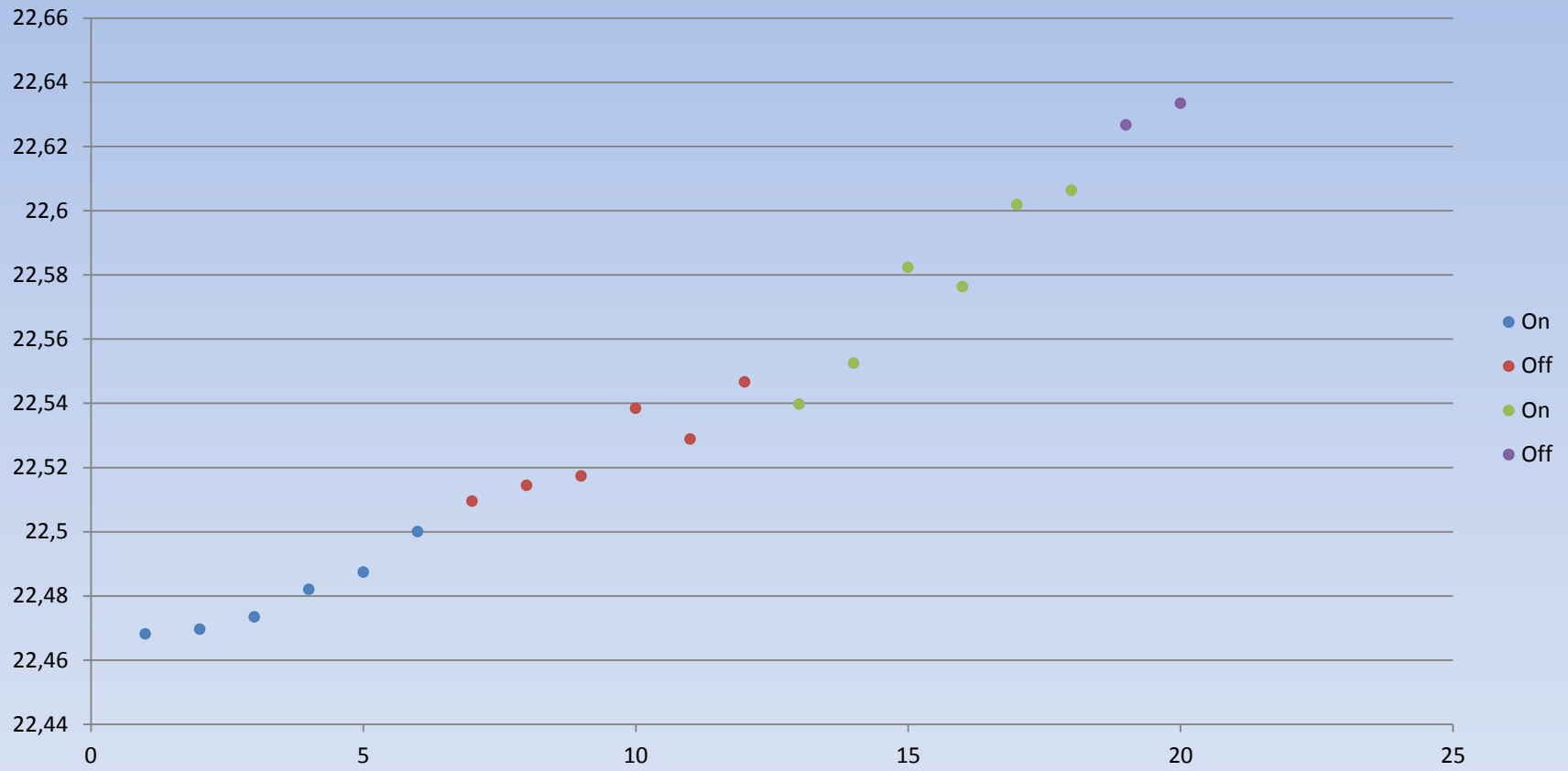


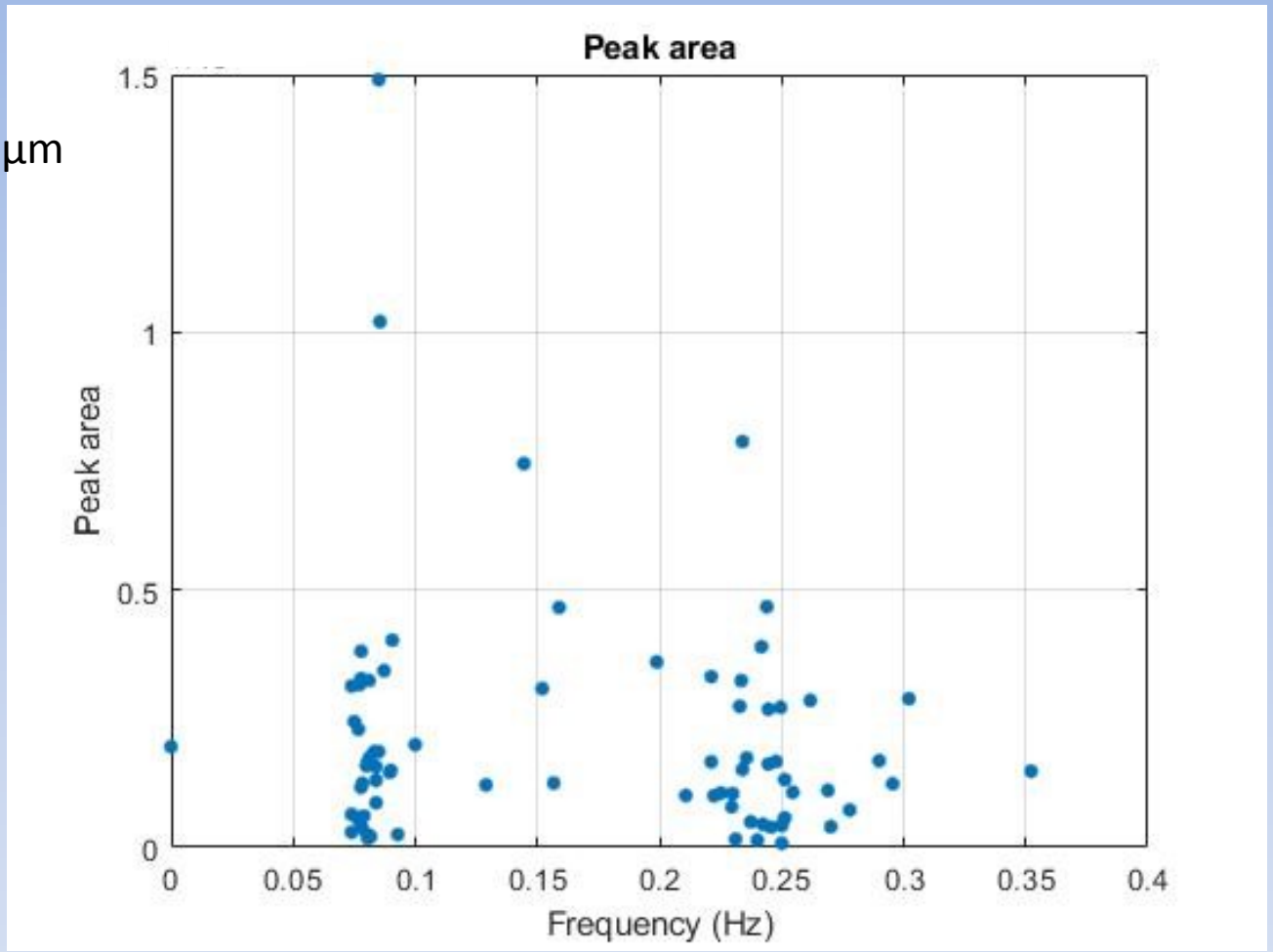
Damping ratio $\zeta = \gamma / \omega_0 = 0.00244 \pm 0.00007$

Quality factor $Q = \sqrt{k * m} / b = 205 \pm 2$



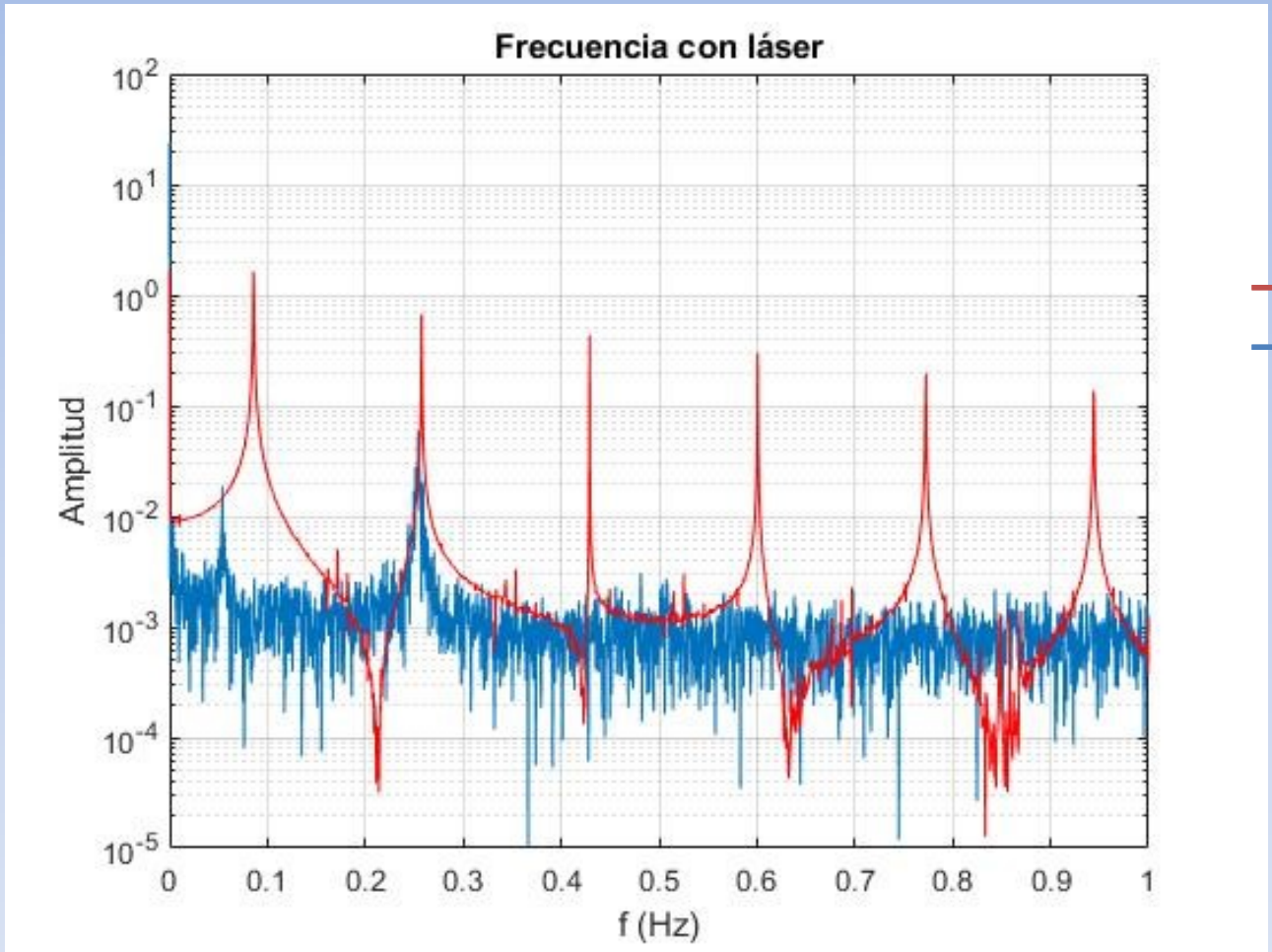
First mode Frequency (Hz)
ON
OFF
f(x)=-3.3332E-05*x+0.0514; R²=-0.0802
f(x)=-1.3608E-05*x+0.051; R²=-0.0734
Temperature (°C)


Average
22,66
22,64
22,62
22,6
22,58
22,56
22,54
22,52
22,5
22,48
22,46
22,44
0
5
10
15
20
25
On
Off
On
Off



1 µm displacement equivalent to 1.3 µN

Resonant thrust 0.04 µN/W


Frecuencia con láser
Amplitud
f (Hz)
Laser light
Pendulum position

Force due to Photon momentum absorption

Light Power= 100 mW = $dNp/dt \cdot h \cdot \nu$

$= dNp/dt \cdot c \cdot h/\lambda$

$P=h/\lambda$

Force = Power/c = $3x10^{-10}$ N = $3x10^{-4}$ μN

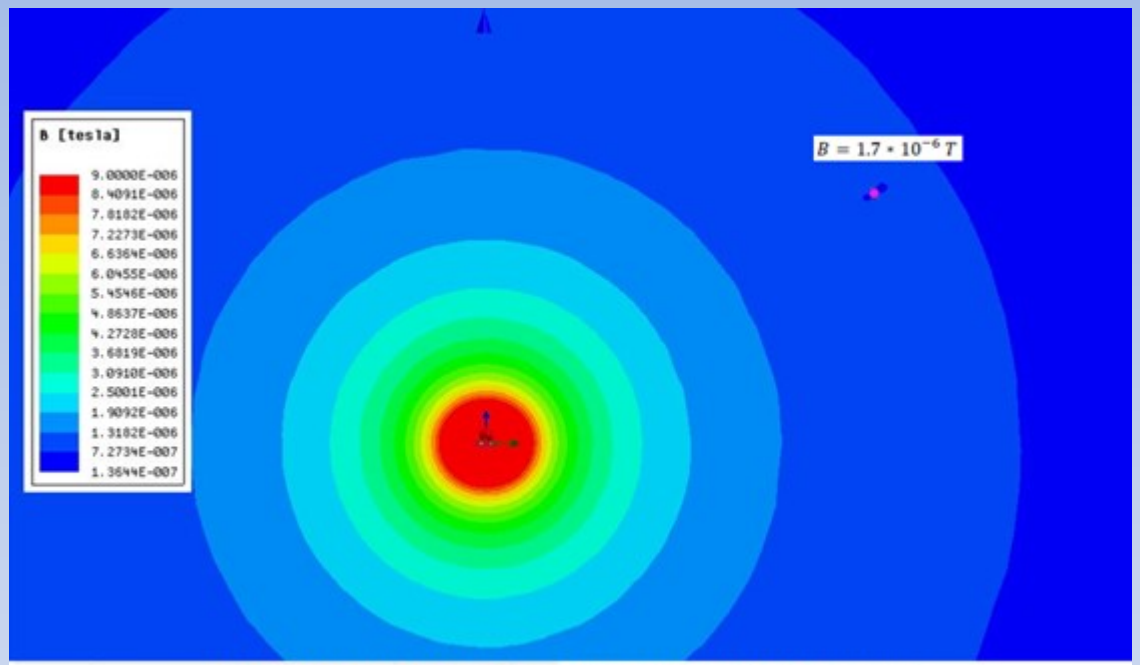


Figure 3. Magnetic field B and force on the nuts in the FEM simulation.

Magnetic Force ~ 2×10^{-10} N

Conclusions

- There is a photon-thrust effect in the amplitude (4 times larger than noise level - third harmonic)

- Magnetism, thermal, photon momentum and any opto-striction effects are estimated to be much smaller.

- Is eventually Dark matter not needed **?** !

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