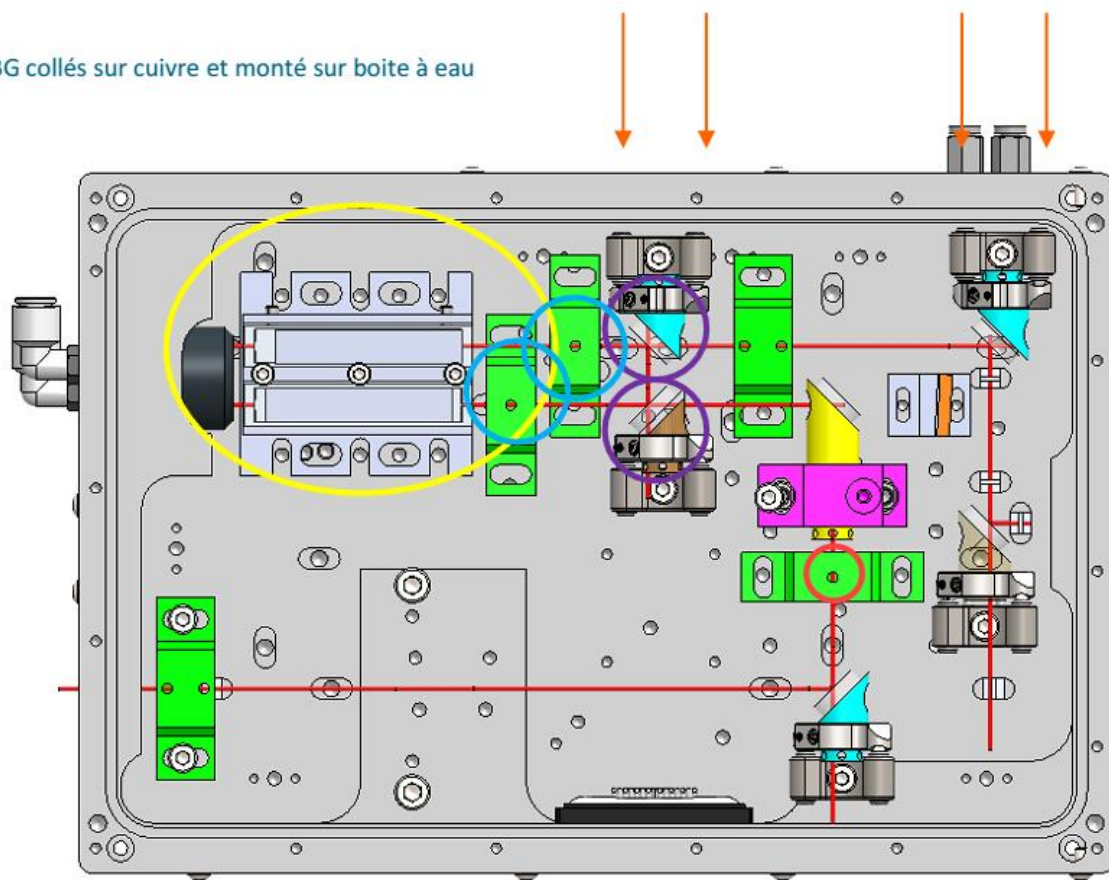


Present setup of the Alphanov amplifier compressor box



CVBG collés sur cuivre et monté sur boîte à eau



Miroirs Thin Film Polarizer



Lame $\frac{1}{4}$ d'onde



Lame $\frac{1}{2}$ onde



Accès réglage Polaris en enlevant les plaques de sécurité

I guess the half-wave plate purpose is to align the polarization axis of the incoming beam in order to properly go through and being reflected by the two thin film polarizer mirror ?

Are we sure of the incoming beam polarization axis ?

Possible problems if not:

- Mount heating
- Back reflection to the amp
- Back reflection to the 1st CVBG
- ...

Thermal image of the Alphanov amplifier compressor box

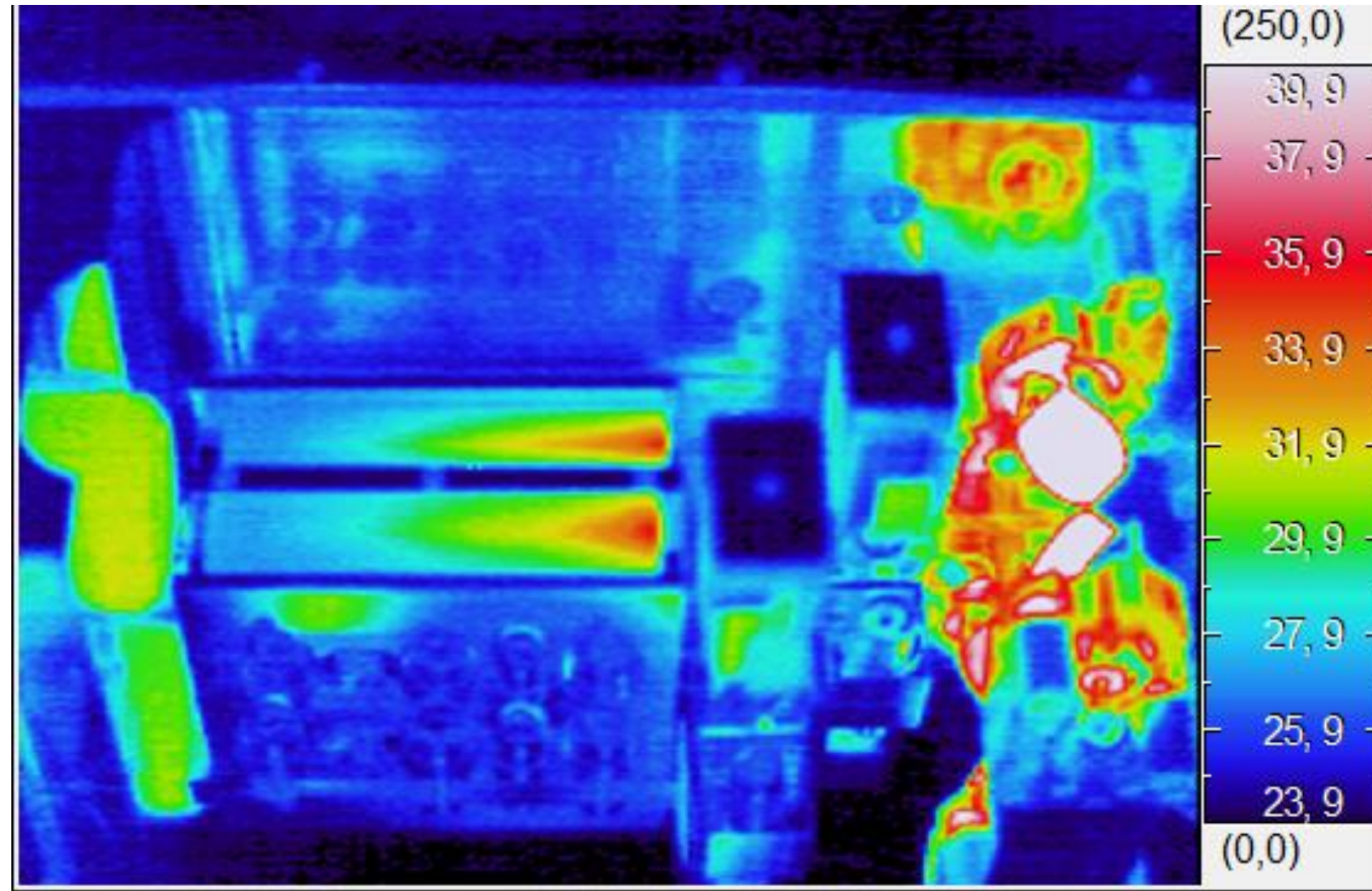


Image with the 2 CVBG on the left with beam power at 80% (~ 57W).

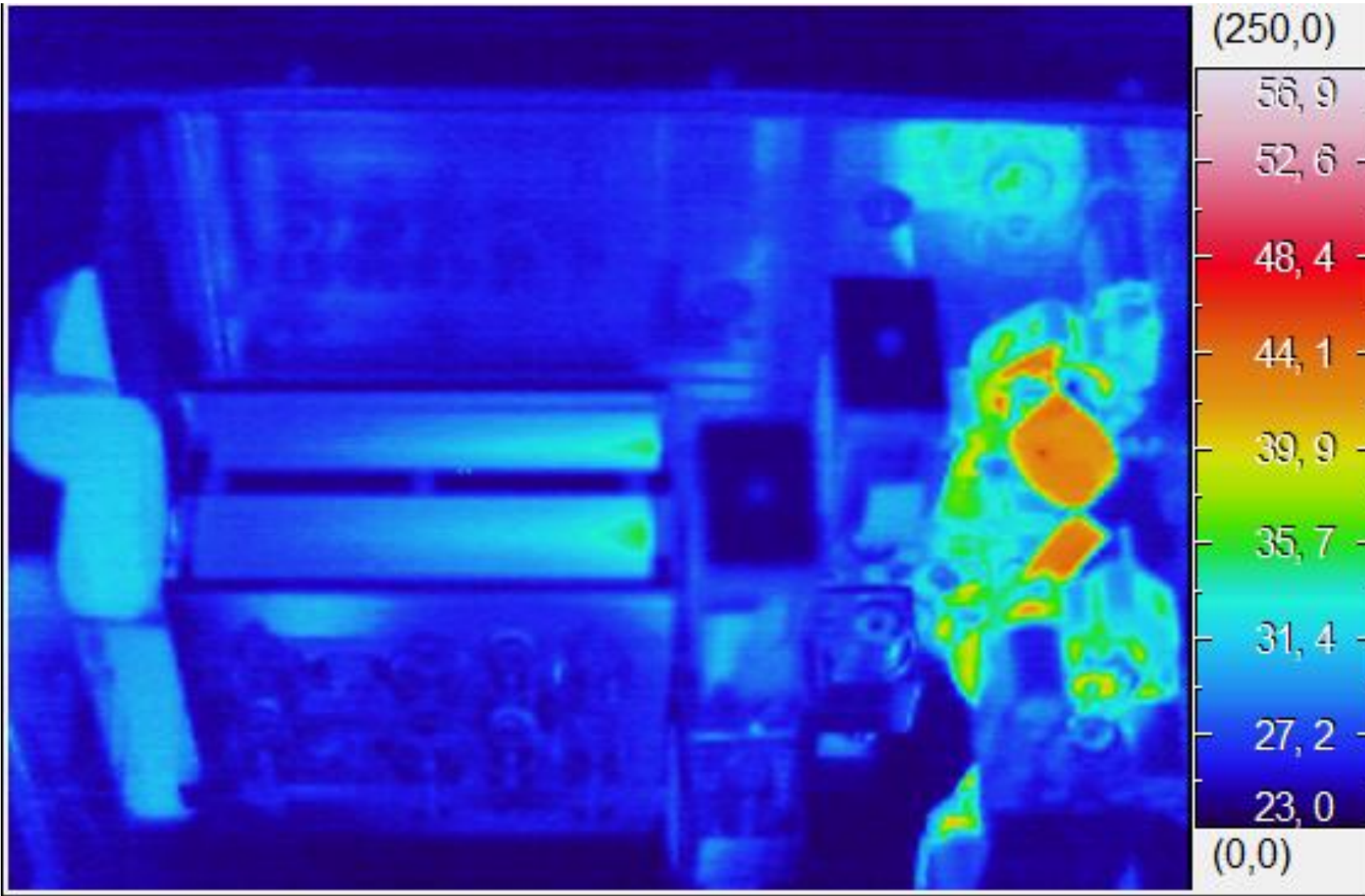
Maximum temperature in CVBG is about 35°

One can see the power decrease (and then the thermal load decrease) with the propagation in CVBGs

1st CVBG temperature trace seems a little bit larger than the 2nd one, maybe due to the laser beam diameter.

Conclusion : everything seems normal for the CVBG.

Thermal image of the Alphanov amplifier compressor box



Exactly same image (then with the same conditions) with a different temperature scale.

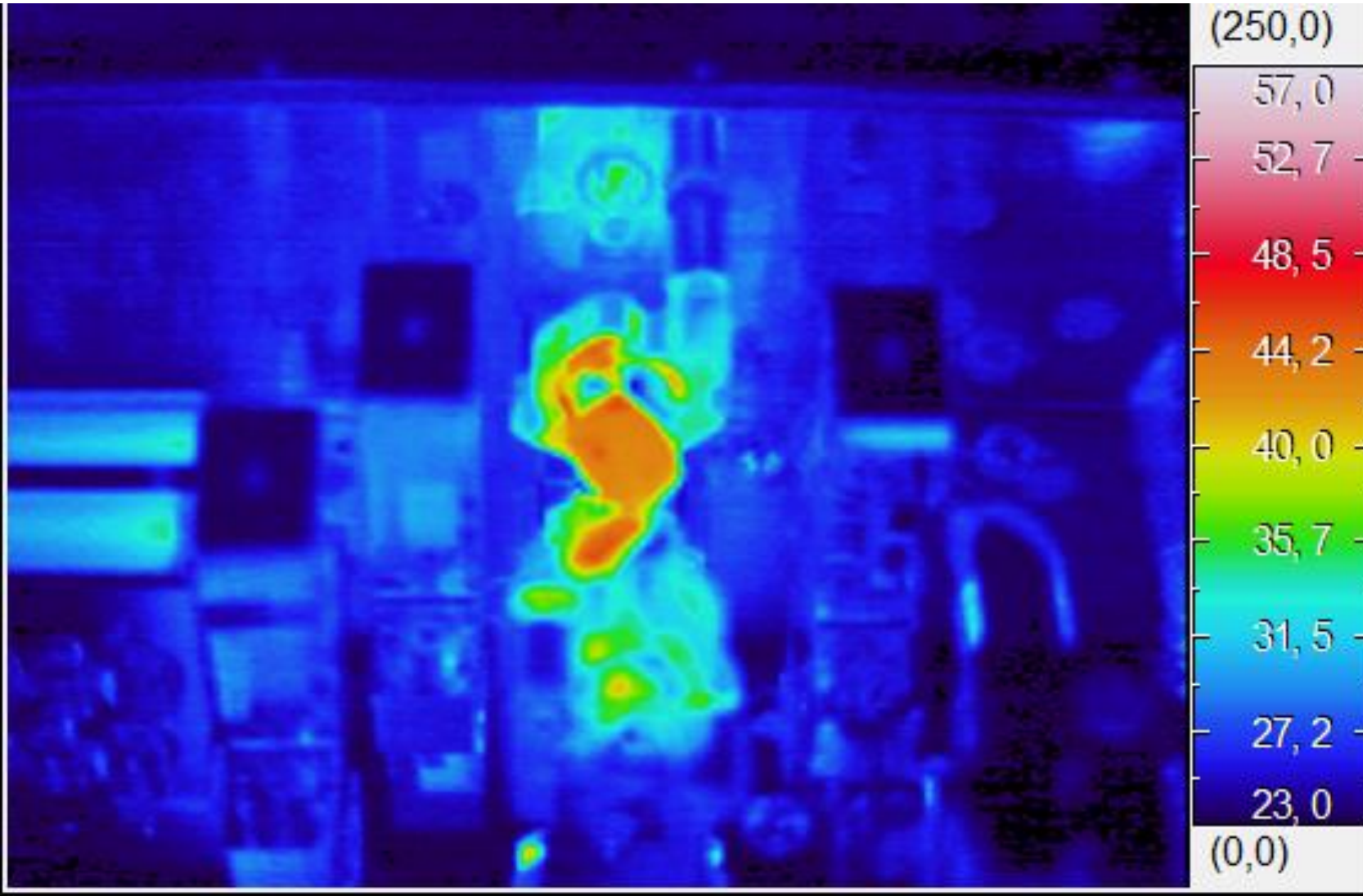
We clearly see the two thin film polarizer mirrors on the right with a temperature around 45° and the small beam spot on the top mirror with a temperature about 50°.

Why these mirrors are so hot compare to the rest of the setup ?

The double path in these thin film mirrors could be the reason ?

Or could it be some small misalignment which produces some scattering on the (thick, half-inch, 45° angle) mirror edges ?

Thermal image of the Alphanov amplifier compressor box



Everything else in the setup seems pretty cool compared to these two thin film mirrors....

Basic thermal model

P_a : absorbed power

P_{rad} : radiative power

D : mirror diameter ~ 12.7 mm

W : mirror thickness ~ 3 mm

A : radiative surface

$$A = 2 \cdot \frac{\pi D^2}{4} + \pi DW \approx 3.7 \cdot 10^{-4} \text{ m}^2$$

Emissivity for glass : $\varepsilon \sim 0.92$

Temperature = $45^\circ \Rightarrow T = 318\text{K}$

Room temperature $\sim 20^\circ \Rightarrow T_r = 293\text{K}$

At the equilibrium : $P_a = P_{rad}$ (+ neglected conduction)

$$P_{RAD} \triangleq \varepsilon \sigma A (T^4 - T_R^4) \Rightarrow P_A = \varepsilon \sigma A (T^4 - T_R^4) \approx 55 \text{ mW}$$

Input power : 57W

$$\text{Absorption with double path: } \frac{P_A}{2 \cdot P_{IN}} \approx \frac{55 \text{ mW}}{114 \text{ W}} \approx 480 \text{ ppm!}$$