Initial Cool Down – The First Run

When starting from scratch, i.e. with a warm (300 K) bolometer at atmospheric pressure, the following steps apply:

Pumping the Cryostat

In order to achieve long holding times, it is necessary to evacuate the cryostat. For doing so, connect it to the turbo pump. Then open the vacuum lock on the cryostat: first unscrew the cap (8 – 9 turns) and then lift it up and secure it by turning it approximately 90 degrees. Pump for at least 24 hours to have a good vacuum. However, the pressure should be at least at approximately 10^{-5} mbar. Close the vacuum lock and turn off the pump. If the cryostat has been opened, a prior leak test is advisable.

Pre-cooling the Cryostat

Pour liquid nitrogen into the nitrogen tank of the cryostat and use the nitrogen fill tube to transfer liquid nitrogen into the helium tank. It is not necessary to fill the helium tank completely, since it will be cooled by the nitrogen tank. Hence, the boil-off rate will not be very high. Filling the warm tanks will take a long time. The nitrogen tank will start to fill after about 10 minutes. If the nitrogen transfer to the helium tank is done with the fill tube, it will take about 10 minutes. Otherwise, pouring it through the funnel will take at least 40 minutes. Once the liquid nitrogen stays in the tanks, it will not take more than a few minutes. Keep it cooling for at least 36 – 48 hours. The evaporator will have reached 77 K (the liquid nitrogen temperature) by then and the ^{3}He resistor thermometer should at least attain a value of 269 Ω. **Do not monitor the ^{3}He temperature continuously, as even in the highest ranges of the multimeter there will be some heating, working against the cool-down.**

When the cryostat has reached liquid nitrogen temperature it is time to empty the helium tank from nitrogen. Use the nitrogen fill tube, where you enter **helium gas in the side connection** and the **liquid nitrogen will be blown out through the top connection**. Use a rubber hose and collect the liquid in the stainless steel bucket. Transfer liquid helium into the helium tank and refill the nitrogen tank. The ^{4}He resistor will be at 3.7 kΩ. Install the pumping fitting and put a Bunsen valve at the output.

Heating the Adsorber

Once liquid helium has been transferred to the helium tank, look at the value of the adsorber resistor. The value should slowly go up. Once it has reached 4 kΩ, turn on the heater and adjust the heater power (voltage 10 – 18 V) to keep the resistance between 3.5 and 4 kΩ. This will slowly cool the evaporator to 4.2 K. Helium boil-off will be considerable and ice will form on the fitting. When the ^{3}He thermometer reaches approximately 400 Ω, stop heating. This stage will be reached after about 2 hours. Wait until boil off decreases and ice melts. Top up with liquid helium and start the recycling procedure.

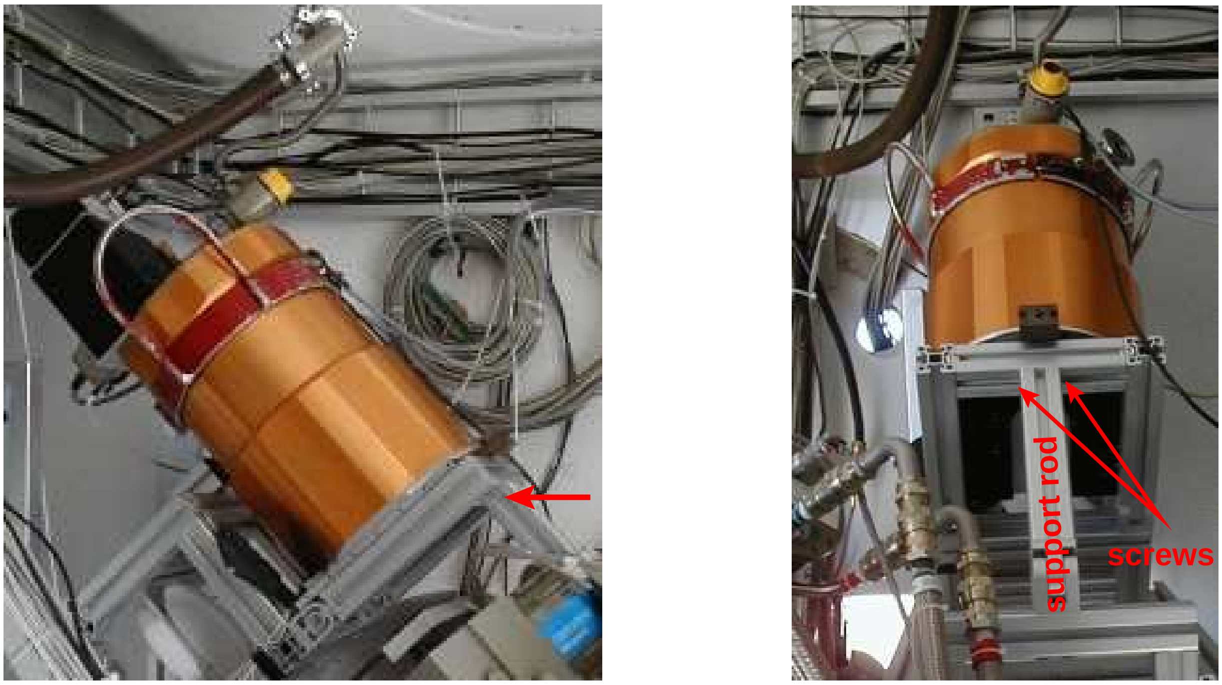

Figure 1: SIMBA cryostat mounting. In order to bring it to an upright position, one has to remove the screws and release the support rod.