

Suggested reading:

<https://courses.physics.illinois.edu/phys523/fa2025/CryogenicsFiles/MinifridgeJaakkoKoivuniemi1998.pdf>

# Homework - due 12/2

In the dipstick DR, we will condense about 2 liters of STP  $^3\text{He}$  gas into liquid. The pump will allow a circulation rate of 35 micro-mole/sec.

Estimate the following:

1. The amount of  $^3\text{He}$  in moles.
2. The volume of liquid  $^3\text{He}$  after being condensed in the mixing chamber.
3. The cooling power of the mixing chamber at 100 mK. The cooling power depends on the incoming temperature of  $^3\text{He}$  entering the mixing chamber.

Estimate the cooling power of the MC at 100 mK for the following incoming  $^3\text{He}$  temperature:

Ti	500 mK	400 mK	300 mK	200 mK
Cooling power (micro-W)				

4. How cold does the incoming  $^3\text{He}$  has to be for the MC to reach 100 mK?