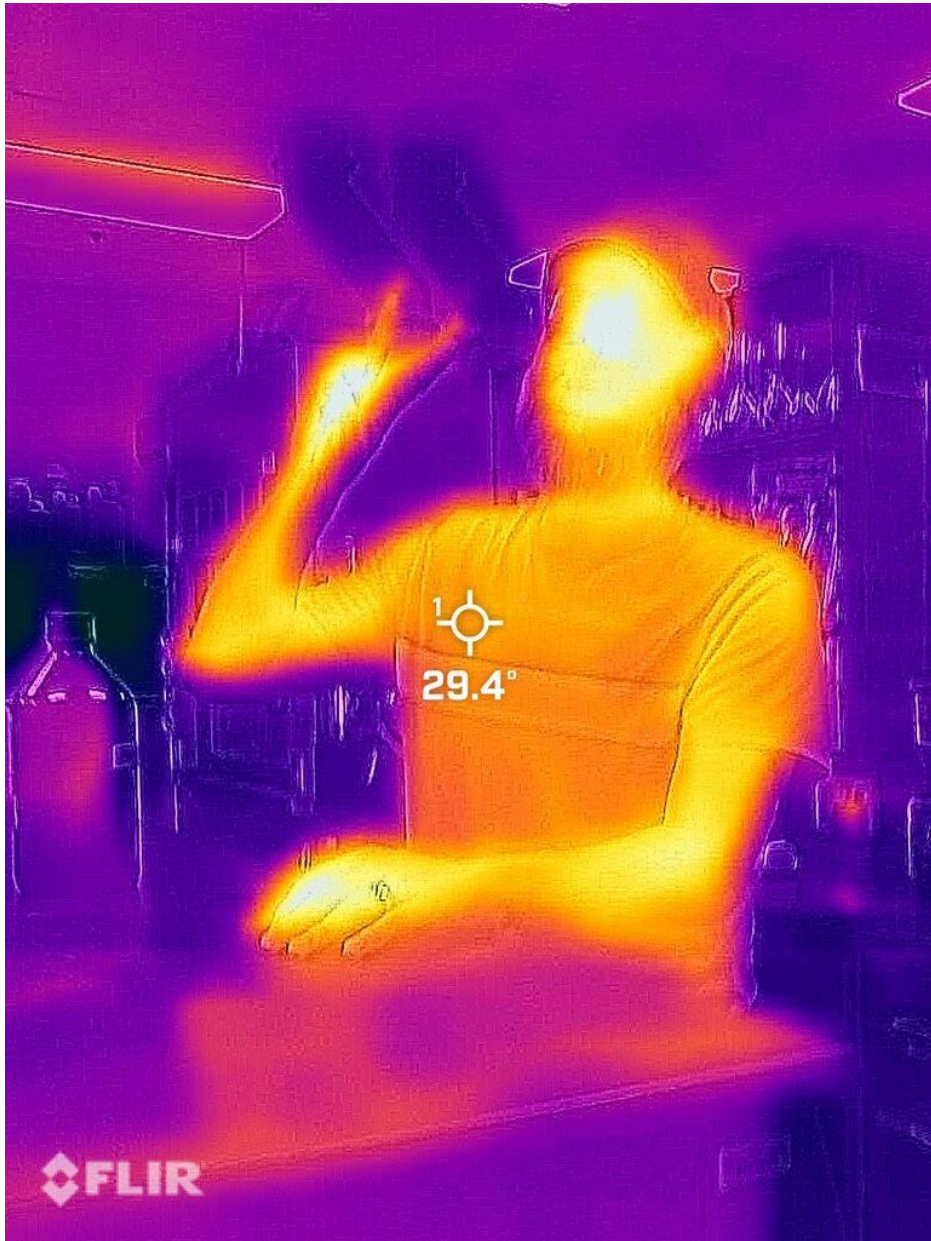


Using IR Thermal Imaging Cameras in the Classroom or Lab

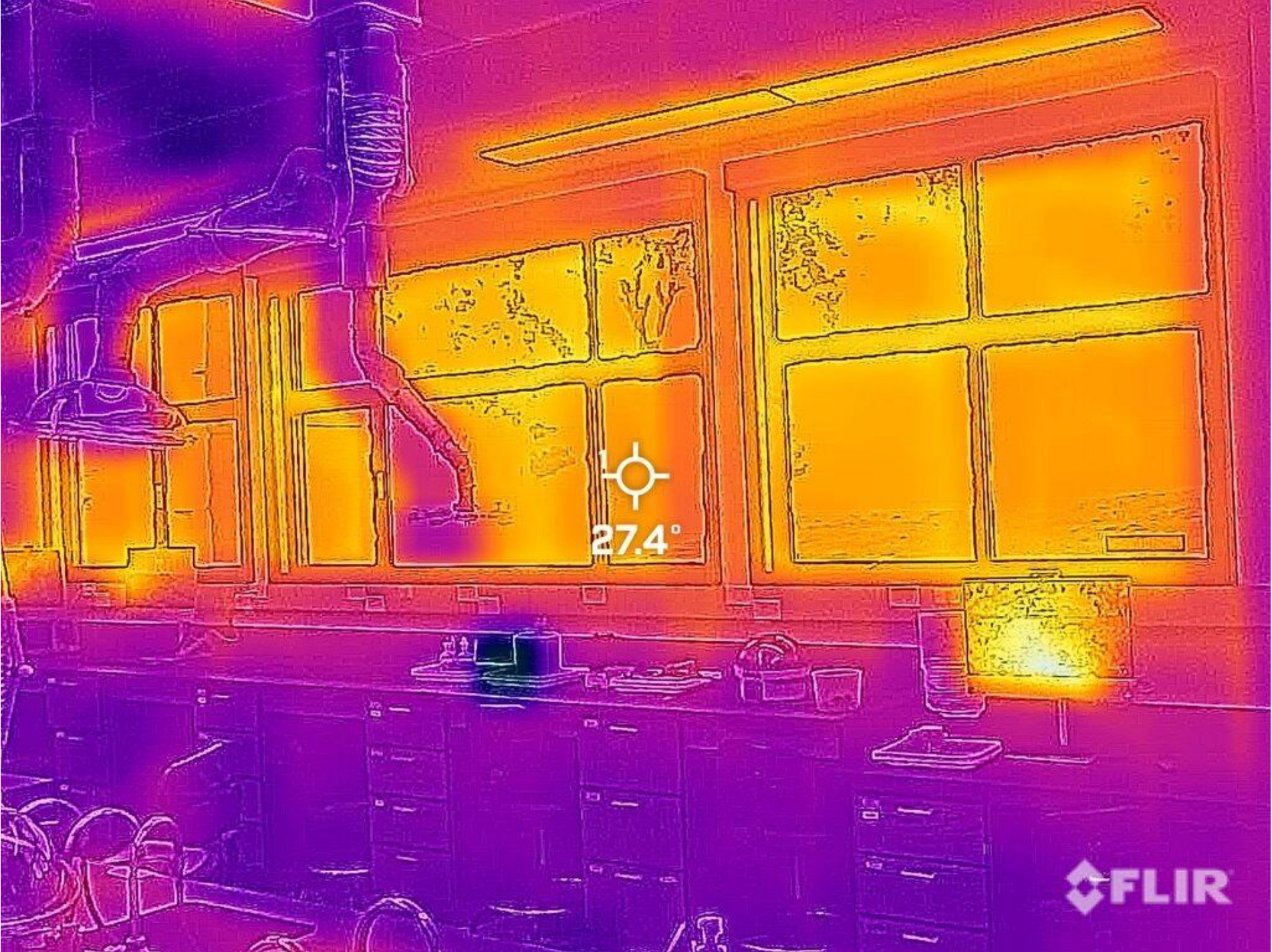
Mike Ansell, Chris Dudzik, and Dan Cearley

Special Thanks to Lina Chea, Jason Maxwell, Gary Wilkes, and Rabiah Choudry



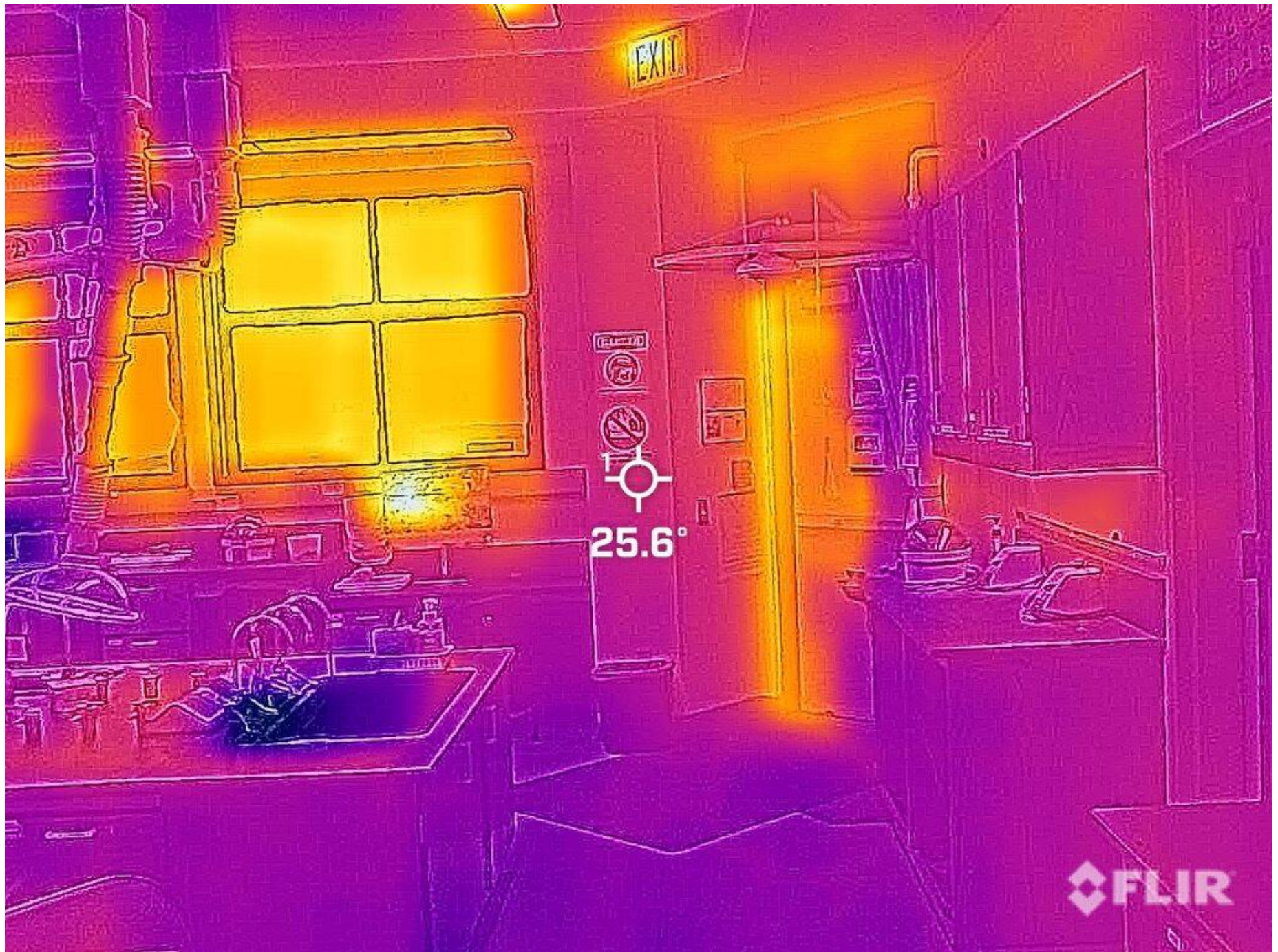
Our first image

Jason Maxwell



27.4°

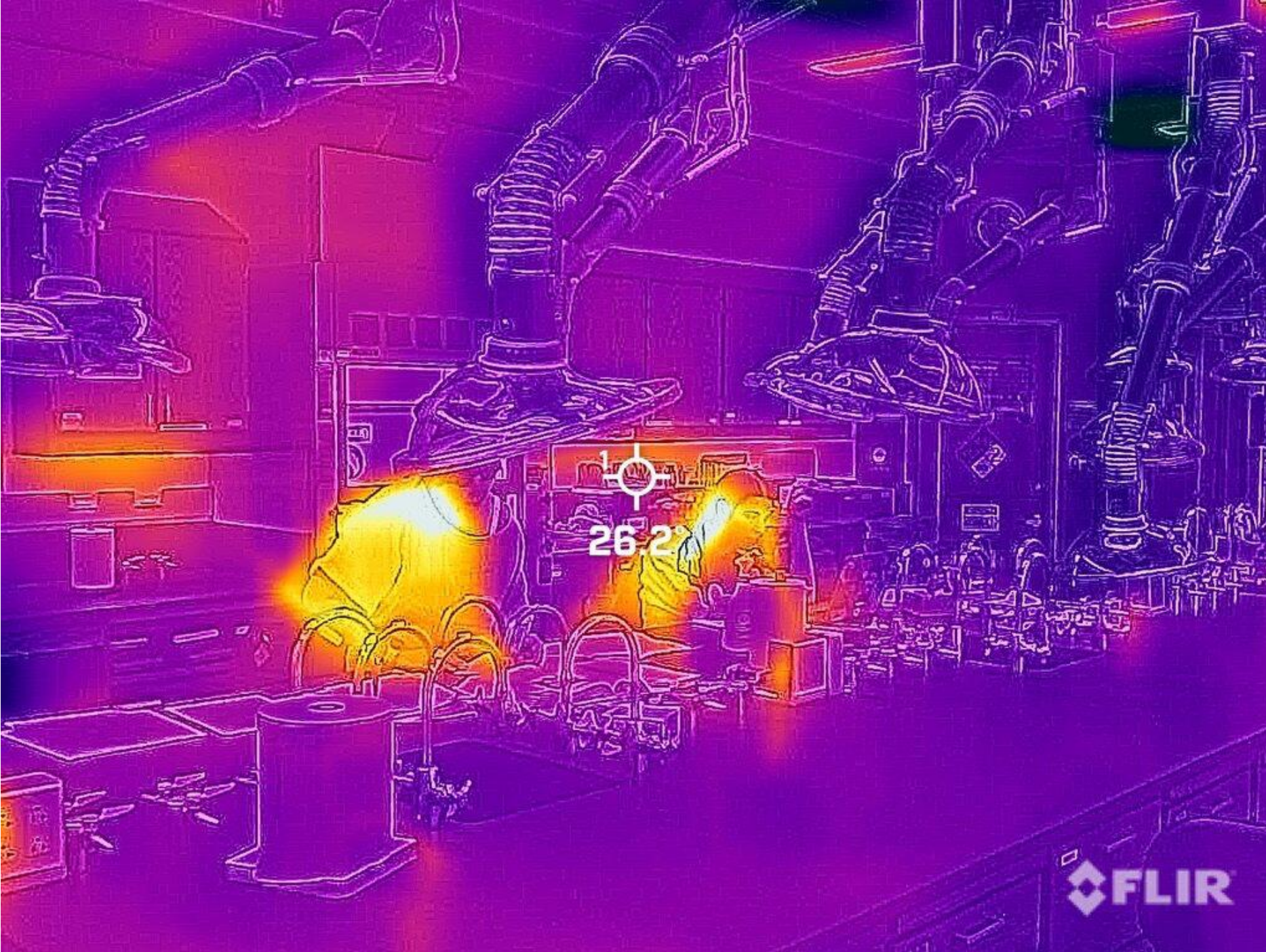
FLIR



EXIT

25.6°

FLIR

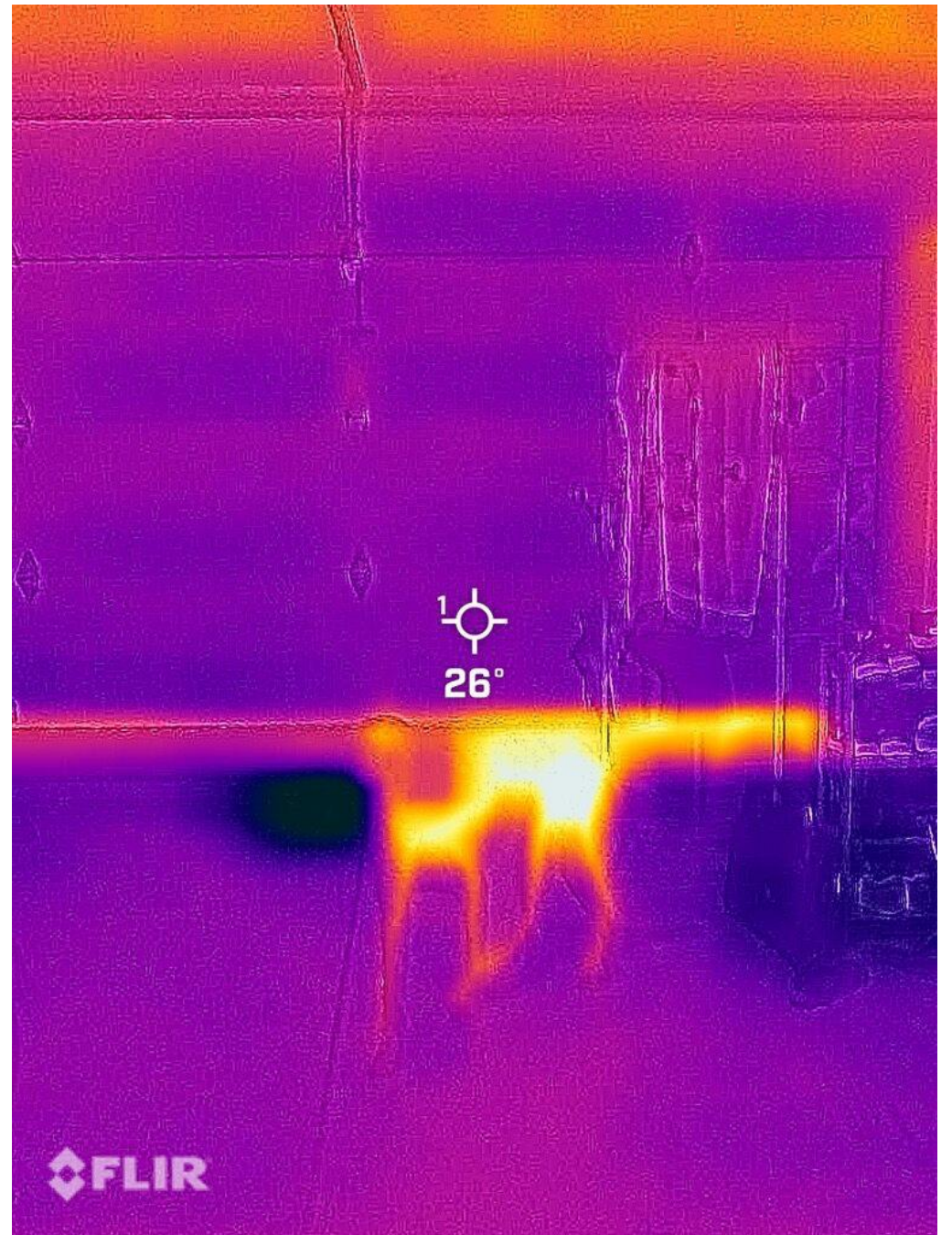


 FLIR

- Images at home:
- Our new heat pump water heater
- It efficiently pumps heat from the room into the water,
- leaving cool air flowing to the garage floor.

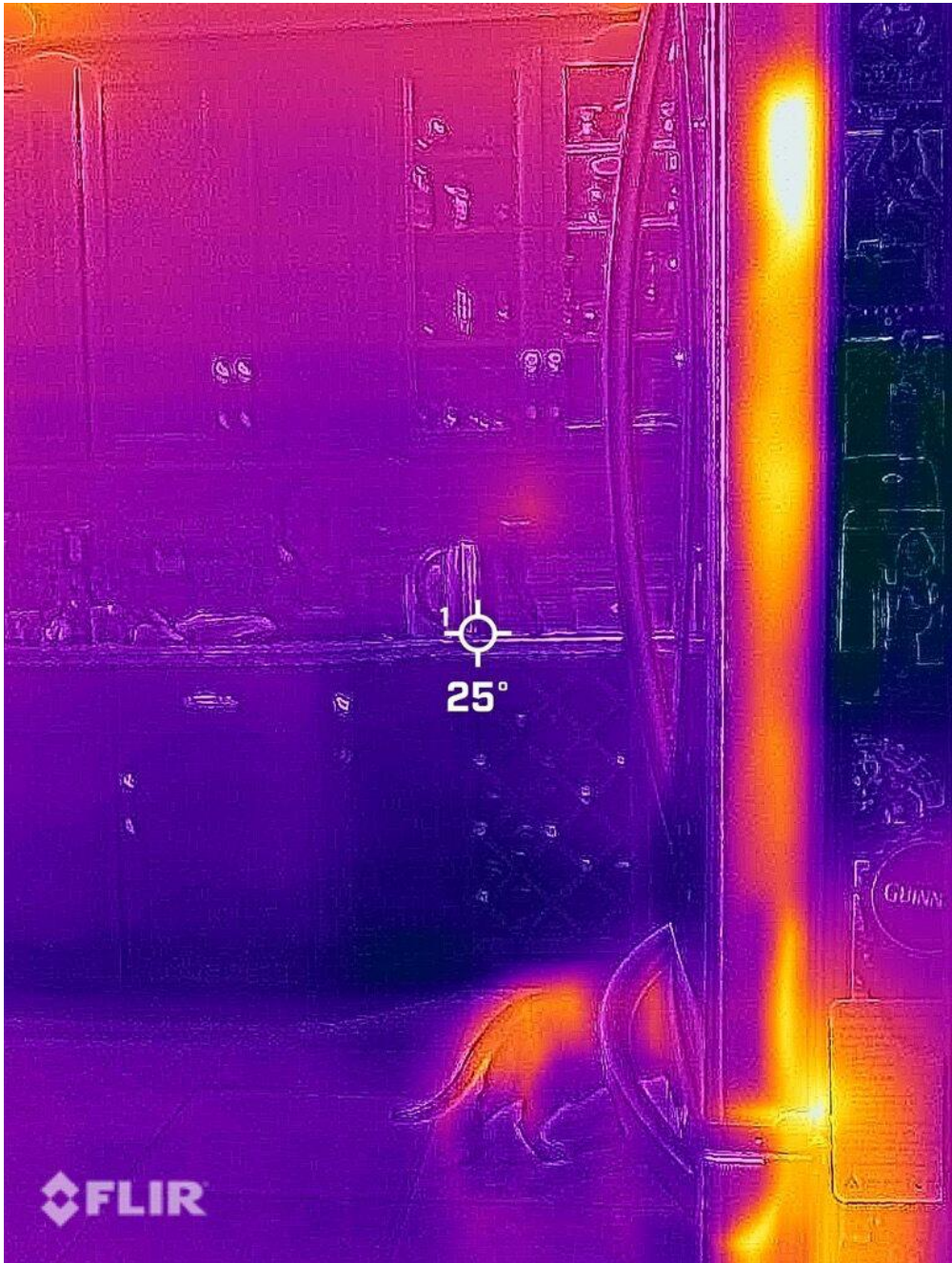


Cosmos, the dog

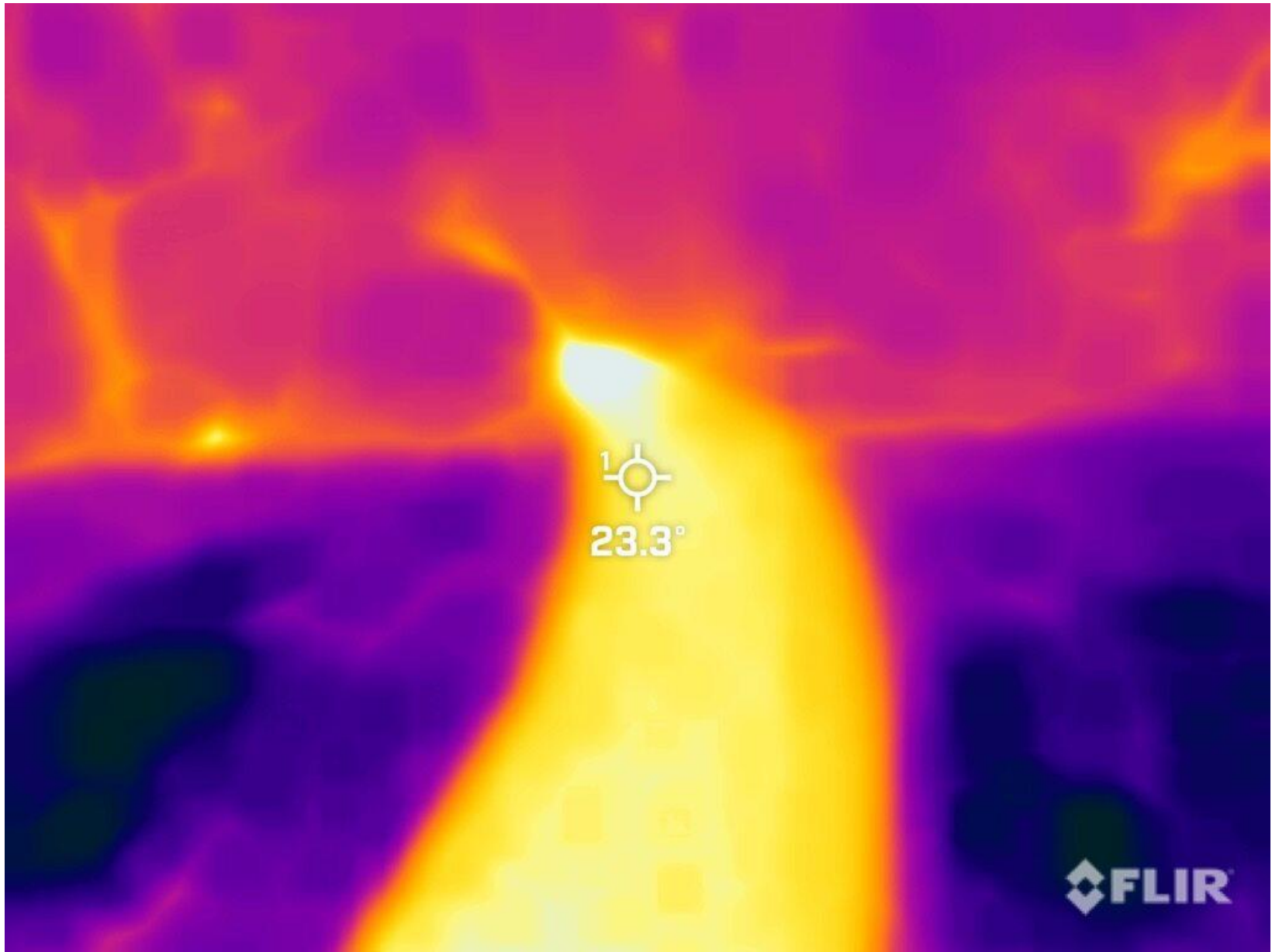




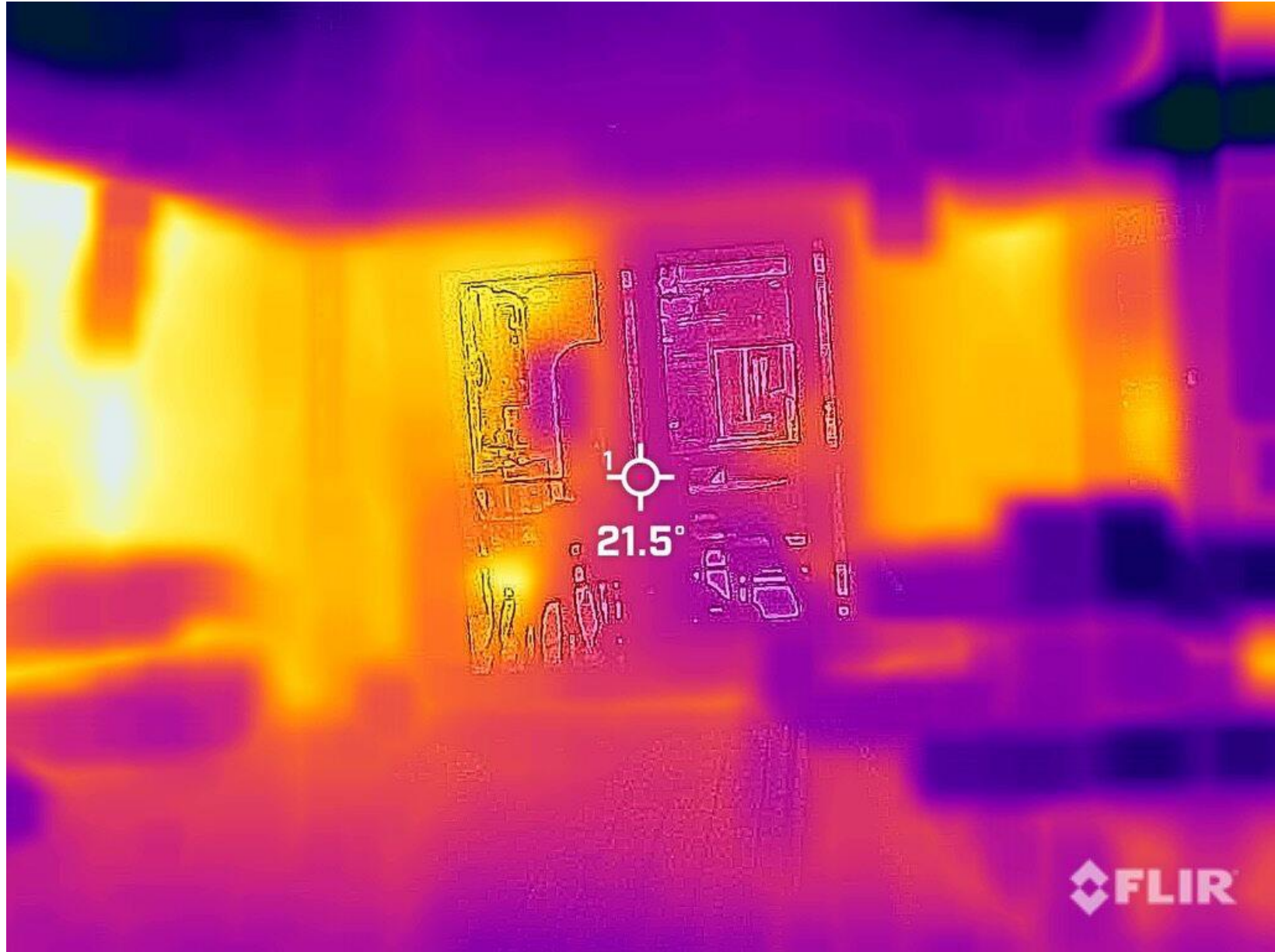
Cosmos in visible light



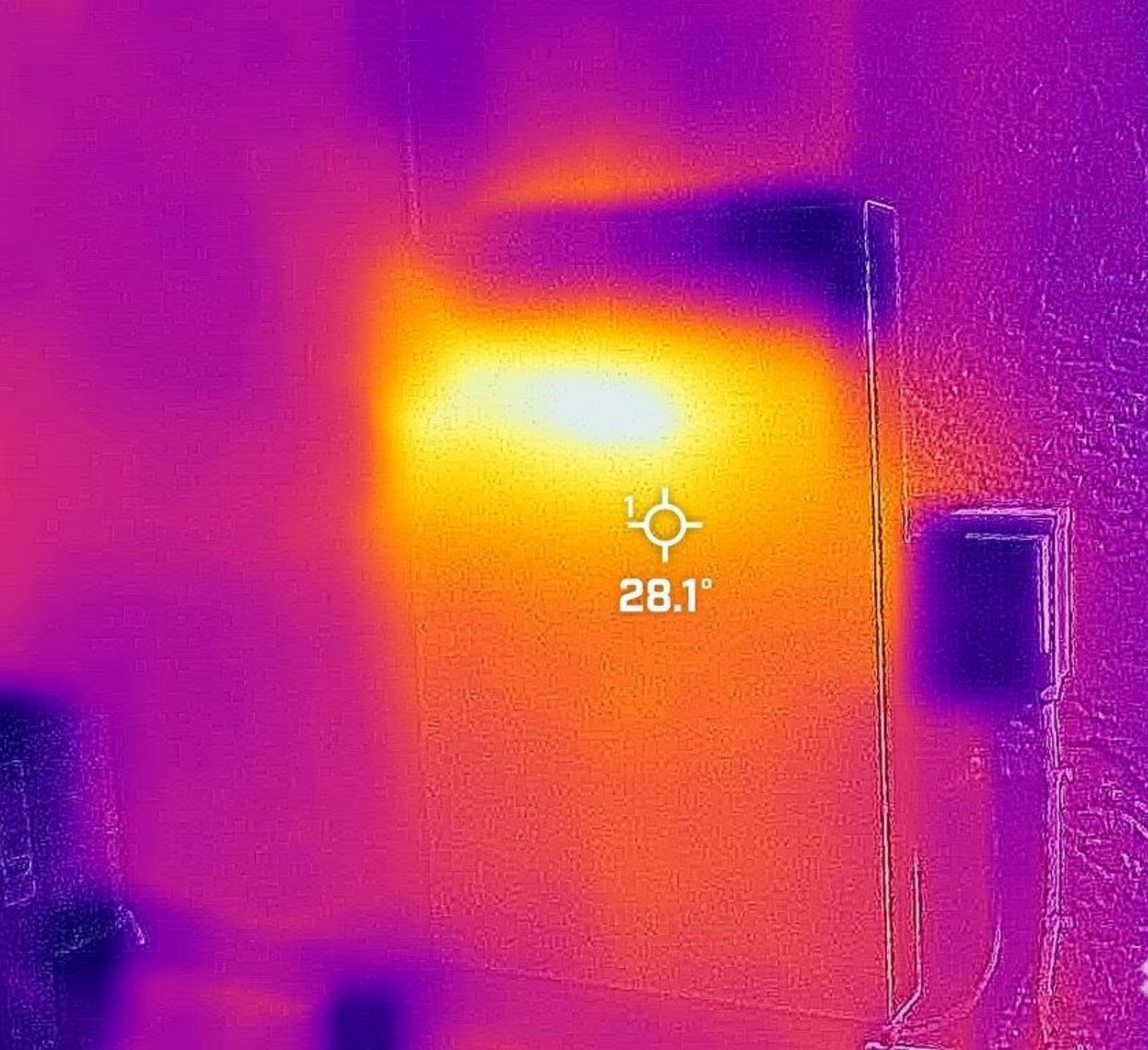
The cat is camera shy.



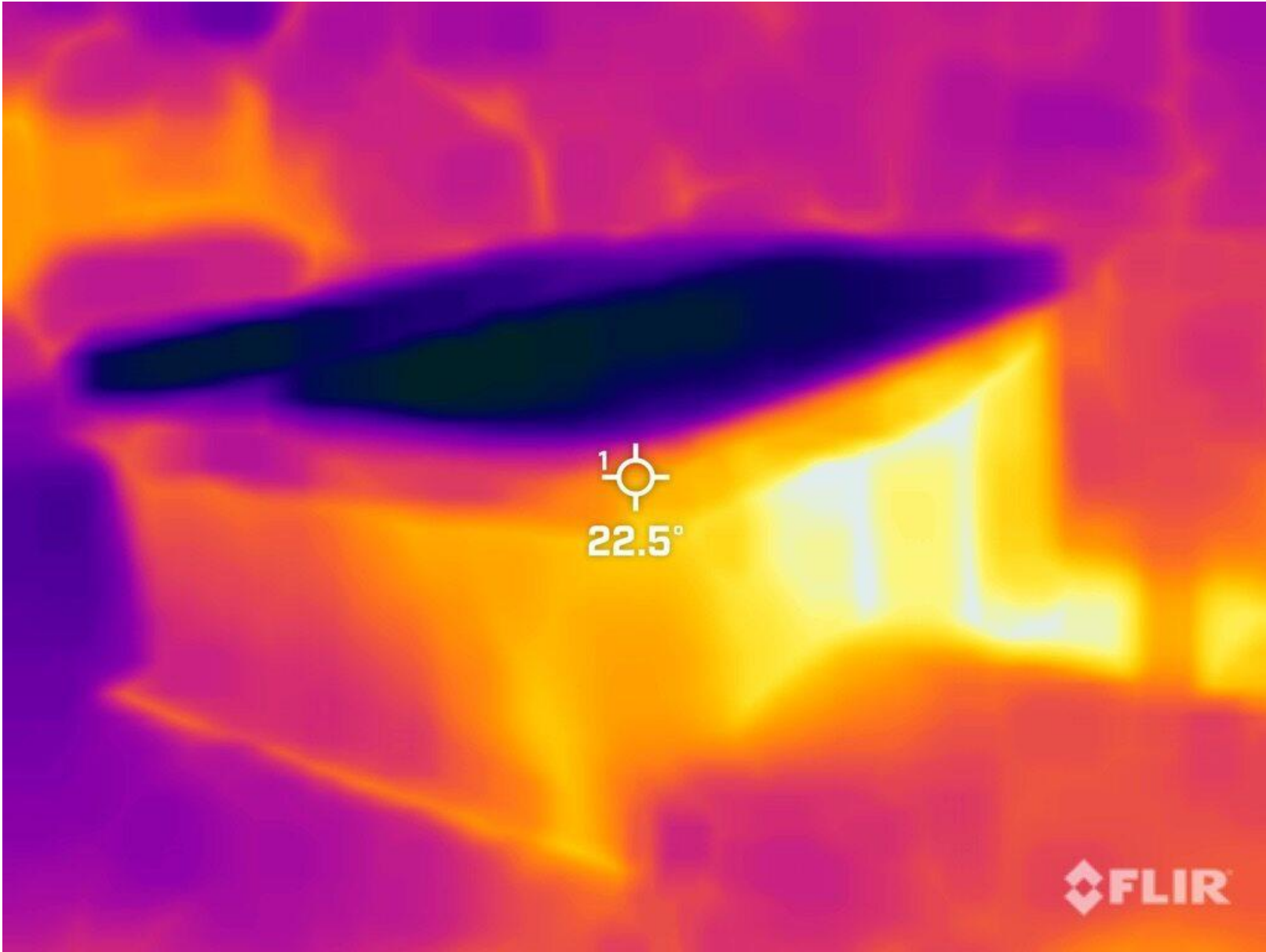
Hot bricks and cool lawn



A warm house after dark



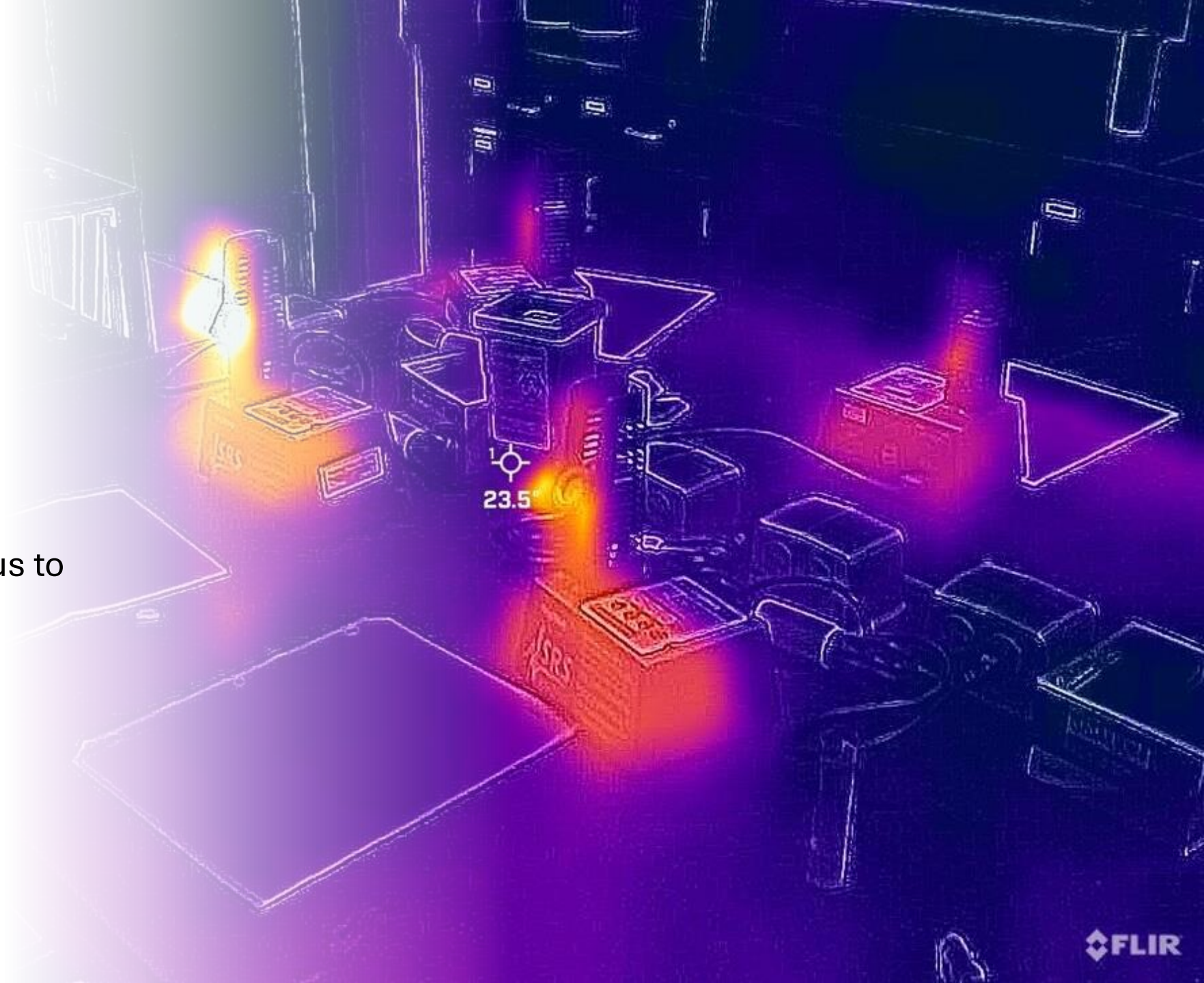
-
- The battery for storing electricity



Hot tub with a new cover

- Back in the lab...

- How can I convince my students that it's dangerous to leave the melt-temps on?





Search entries or author...

All



Sort

View Split Screen



Expand Threads



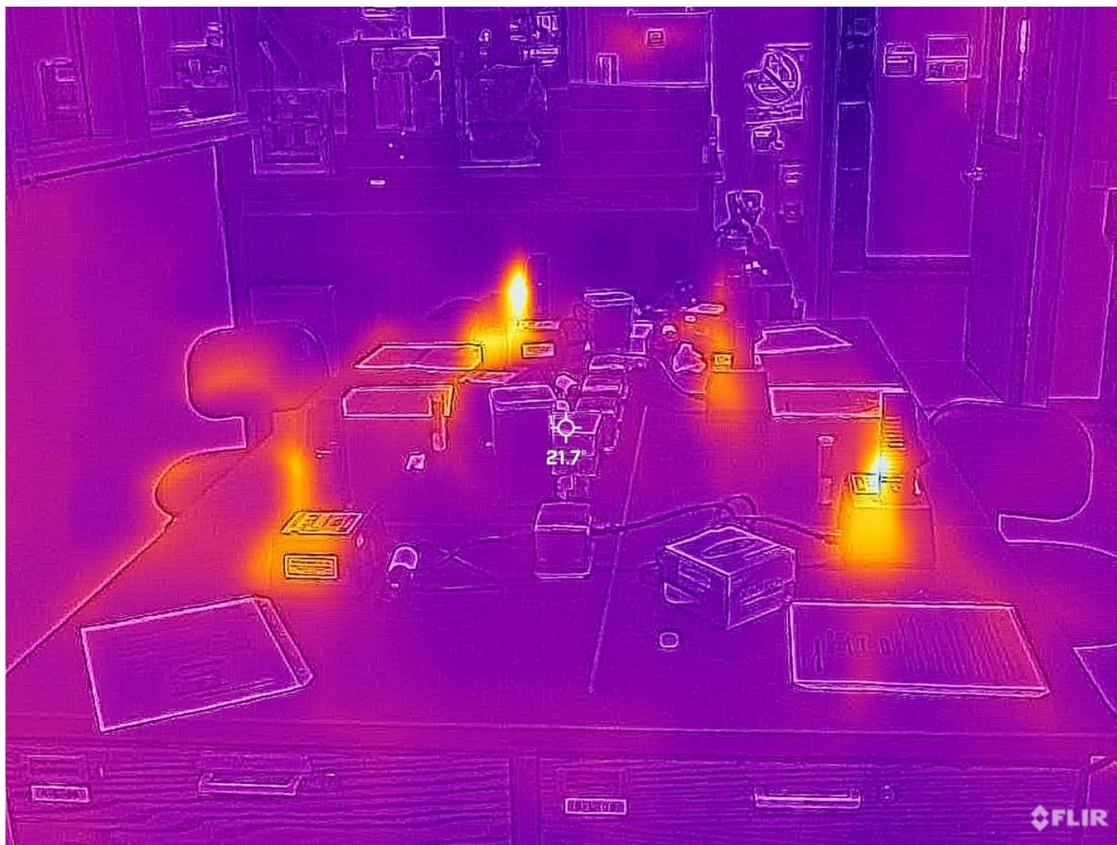
MICHAEL ANSELL AUTHOR | TEACHER

Created Sep 18 8:56am | Posted Sep 18 8:56am

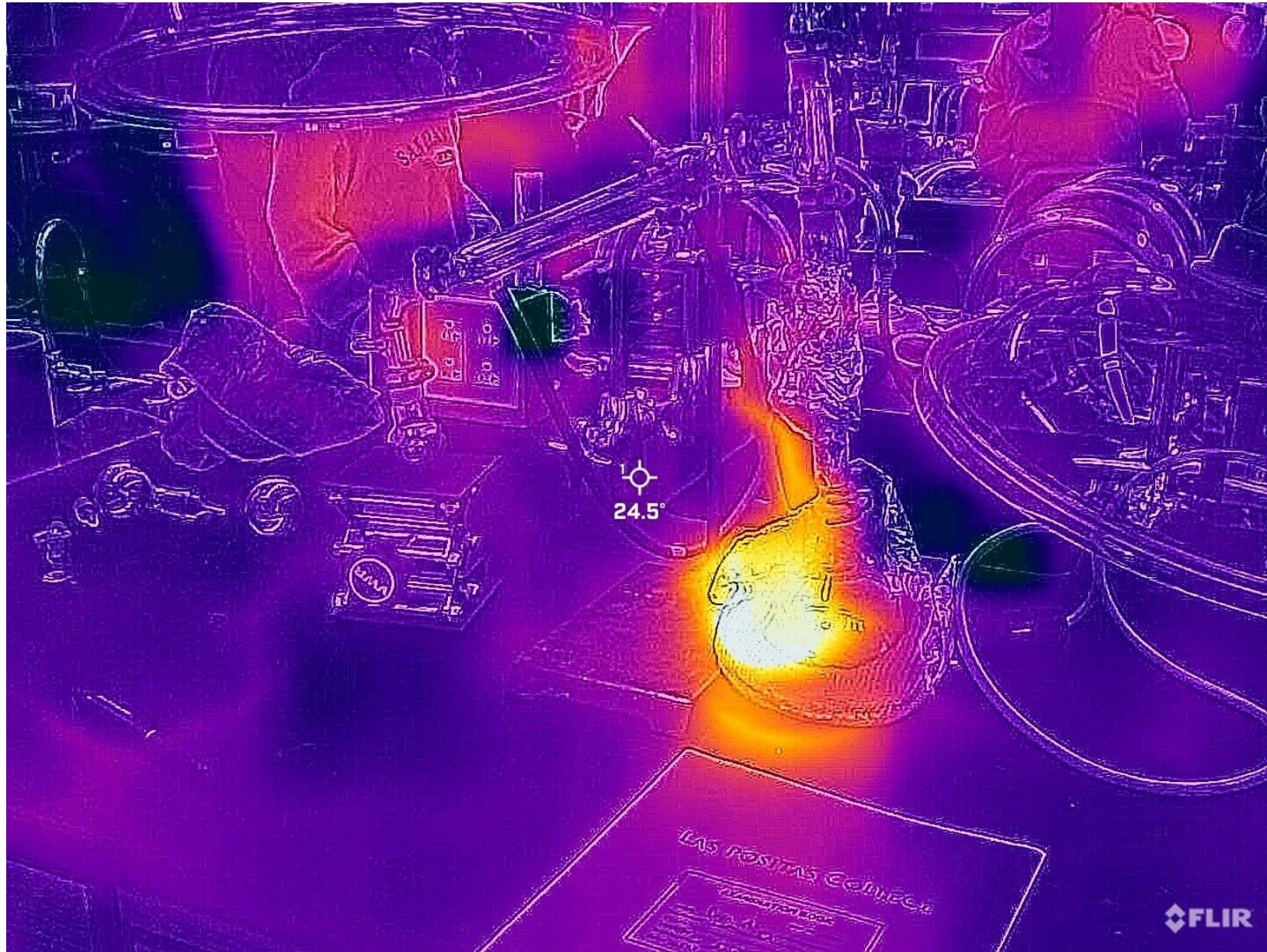


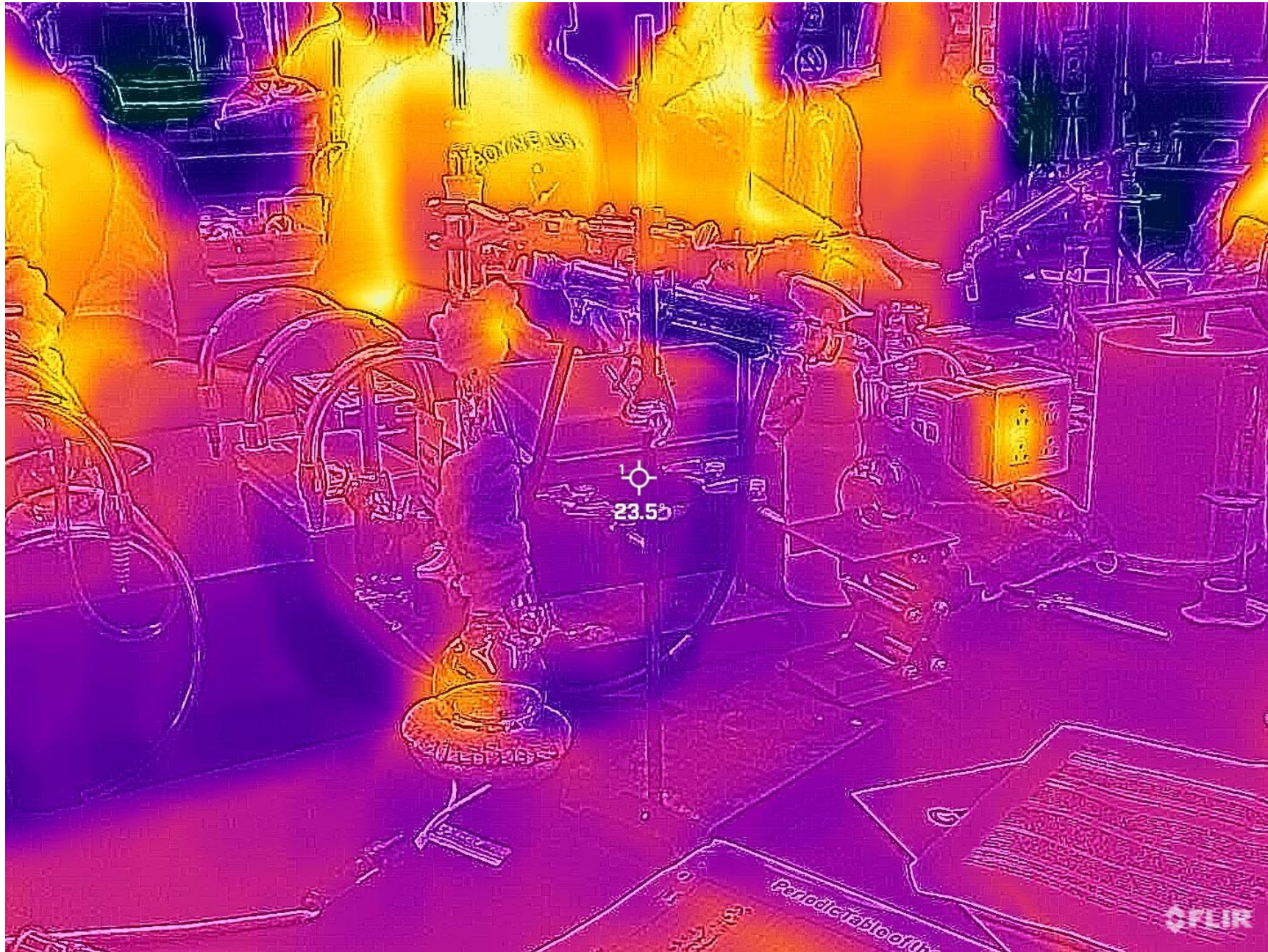
Please turn off the melting point instruments when you're done

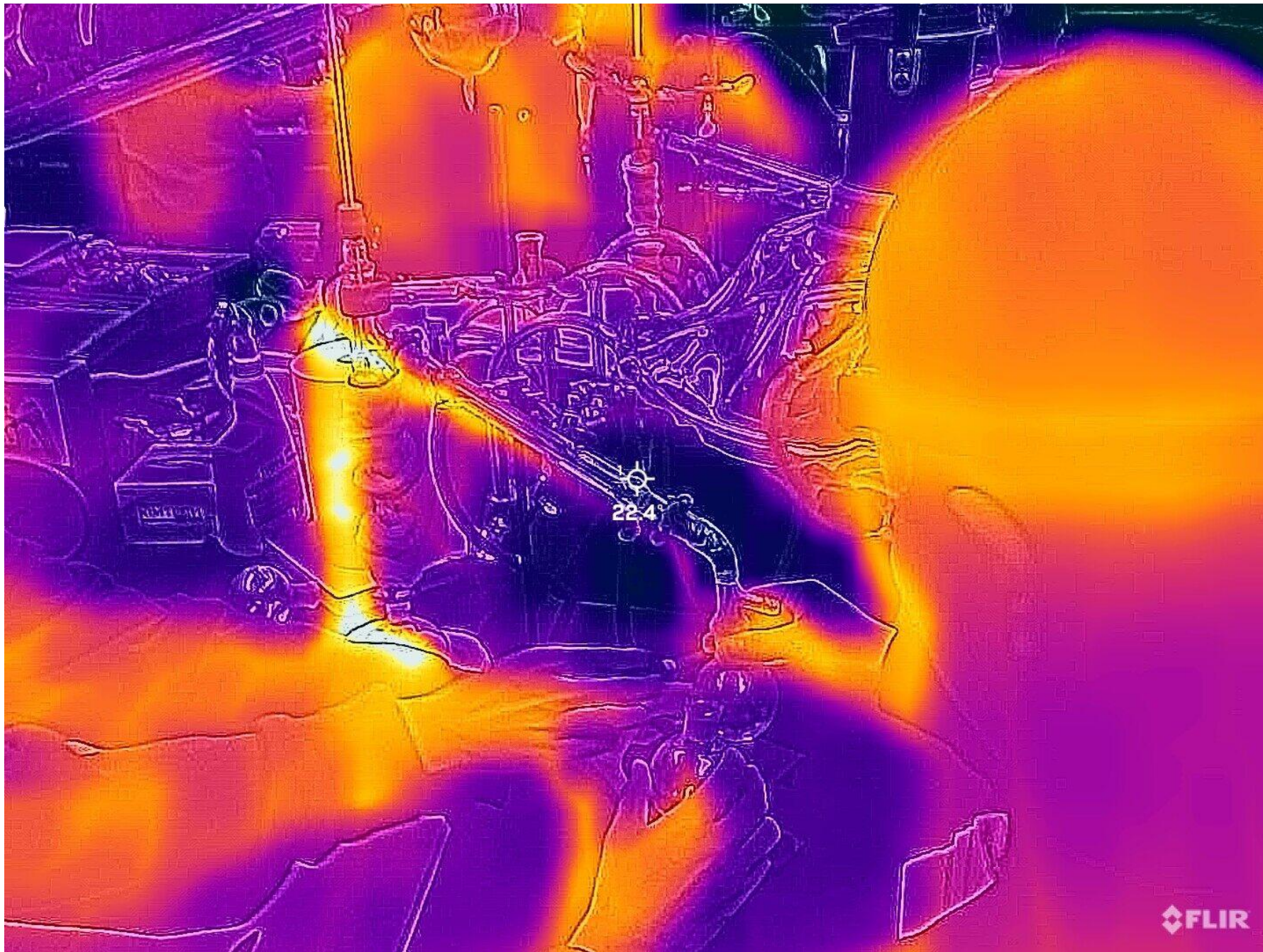
Please make sure to turn off the melting point instruments when you're done. All were left on last Friday. One was left at 150 degrees and could have started a fire. We got a new IR thermal imaging camera that shows the problem.



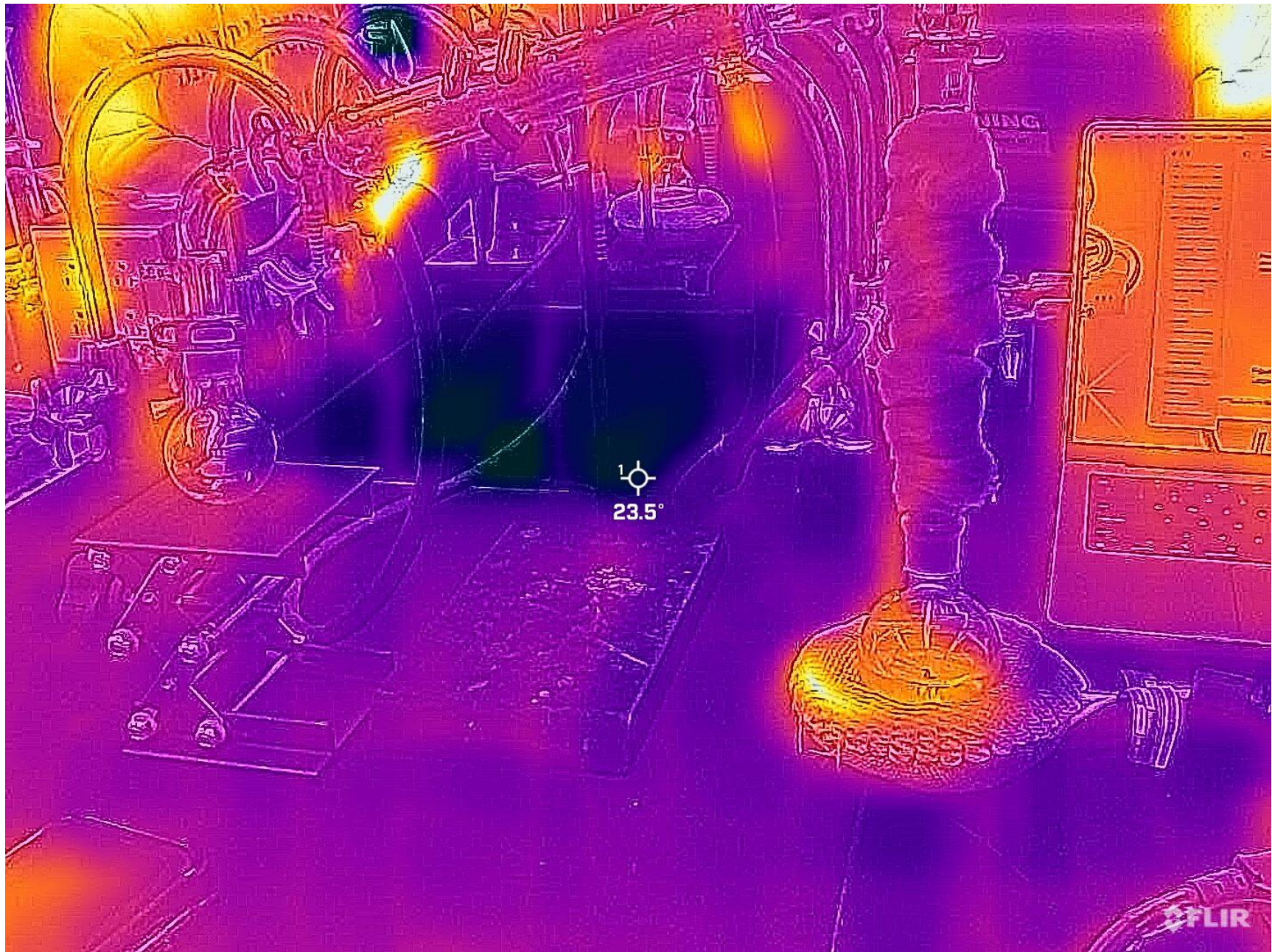
Reply

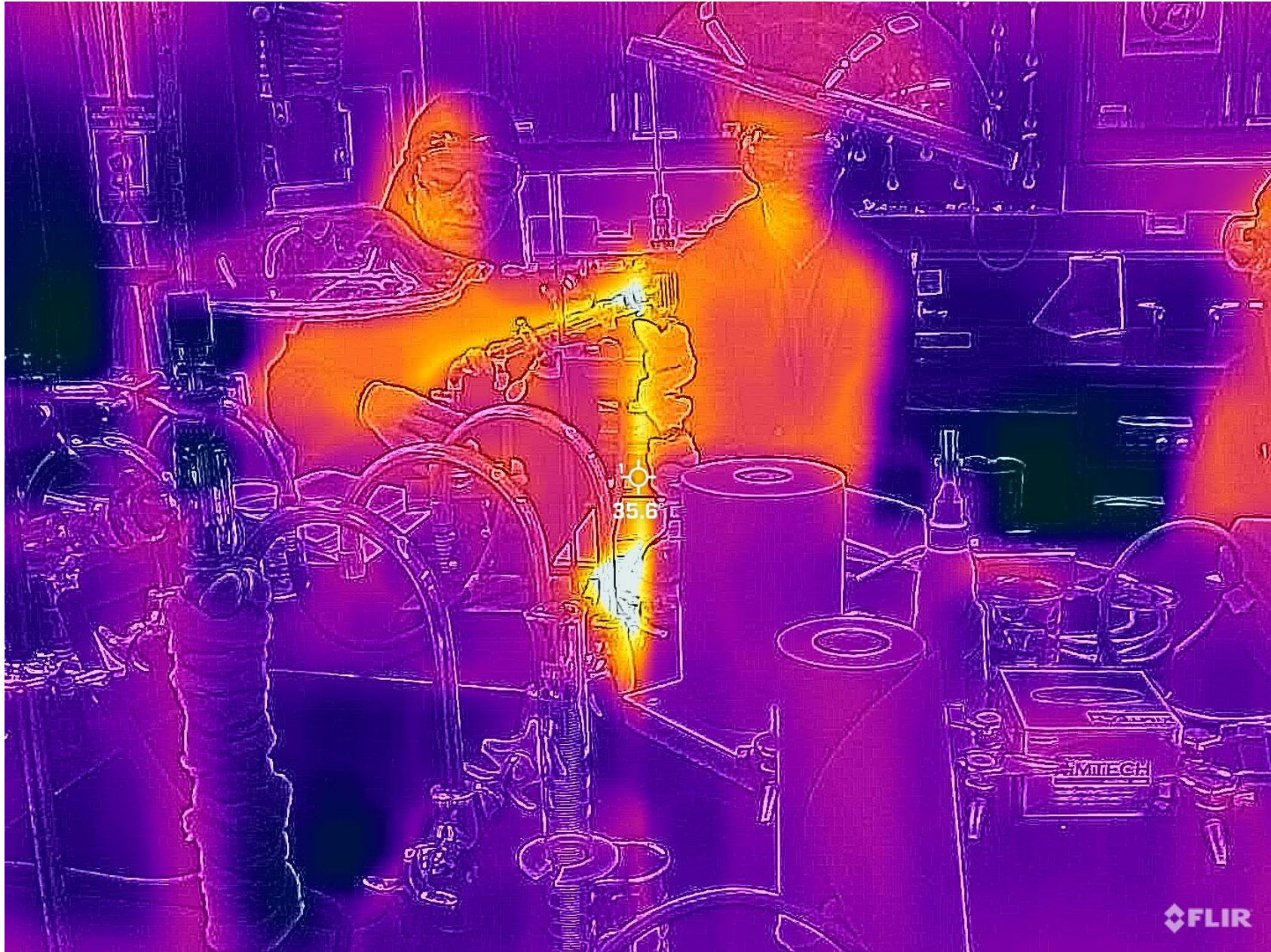






IMG_0006.MOV







Equipment Used in Experiments

X = Required
O = Optional

		Colorimeter or Spectrometer	Conductivity	Current Probe or Constant Current System	Drop Counter	Gas Pressure	ORP Sensor	pH	Radiation	Temperature	Voltage	
1	The Determination of a Chemical Formula	No sensor										
2	The Determination of the Percent Water in a Compound	No sensor										
3	The Molar Mass of a Volatile Liquid					O				X		
4	Using Freezing-Point Depression to Find Molecular Weight									X		
5	The Molar Volume of a Gas					X				X		
6	Standardizing a Solution of Sodium Hydroxide				O			X				
7	Acid-Base Titration				O			X				
8	An Oxidation-Reduction Titration: The Reaction of Fe(II) and Ce(IV)				O		X					
9	Determining the Mole Ratios in a Chemical Reaction									X		
10	The Determination of an Equilibrium Constant	X										
11	Investigating Indicators				O			X				
12	The Decomposition of Hydrogen Peroxide					X				O		
13	Determining the Enthalpy of a Chemical Reaction									X		
14	(Parts A and B) Separation and Qualitative Analysis of Cations and Anions							O				
15	(Parts A and B) The Synthesis and Analysis of Alum									X		
16	Conductimetric Titration and Gravimetric Determination of a Precipitate		X		O							
17	Determining the Concentration of a Solution: Beer's Law	X										

Any experiment with heat or temperature changes might be interesting...

Thermal Cameras
 Thermal Camera, students can observe temperature changes on convection, track heating due to friction, compare heat conduction, analyze the transparency of materials in infrared compared to much more.

NEW FLIR ONE Pro LT
 FLIRLT-10S \$299

FLIR ONE Gen 3
 FLIRONE3-10S \$199

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Stainless Steel Temperature Probe
 Range -40 to 135°C
 TMP-BTA \$29

Surface Temperature Sensor
 Range -25 to 125°C
 STS-BTA \$23

Vernier Thermal Analysis Plus App
 The Vernier Thermal Analysis Plus app makes it possible to analyze temperatures of up to four spots or regions and collect temperature data as a function of time. Examine the in-app graph, select different points or regions to examine, collect time-lapse videos for longer experiments, or export data to Graphical Analysis GW or Logger Pro 3 for further analysis.
www.vernier.com/thermal-analysis

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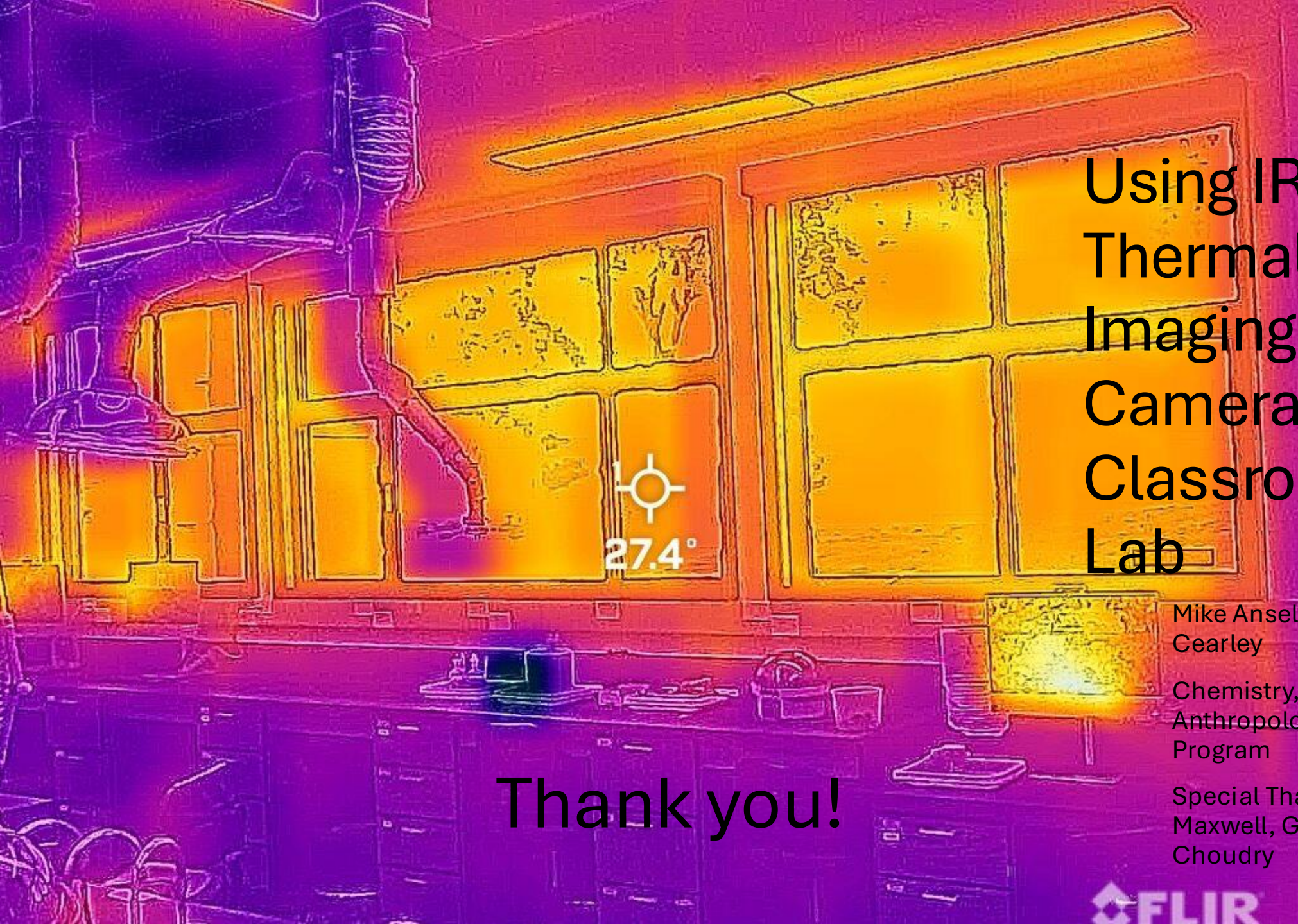
Handwritten note on yellow sticky:
 THEY ARE A GOOD RESOURCE LET'S DO SOME FURTHER RESEARCH FOR DETAILS

Software:

FLIR One – Free and easy to use

Vernier Thermal Analysis Plus - \$9.99

Graphs temperature at up to 4 points

A thermal image of a classroom or laboratory. The image shows a room with a large window on the right, a desk with various items on the left, and a ceiling-mounted light fixture. A white crosshair symbol is overlaid on the window, with the temperature '27.4°' displayed below it. The FLIR logo is visible in the bottom right corner of the image.

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Mike Ansell, Chris Dudzik, and Dan Cearley

Chemistry, Environmental Science, Anthropology, and the Drone Program

Special Thanks to **Lina Chea**, Jason Maxwell, Gary Wilkes, and Rabiah Choudry

Thank you!

