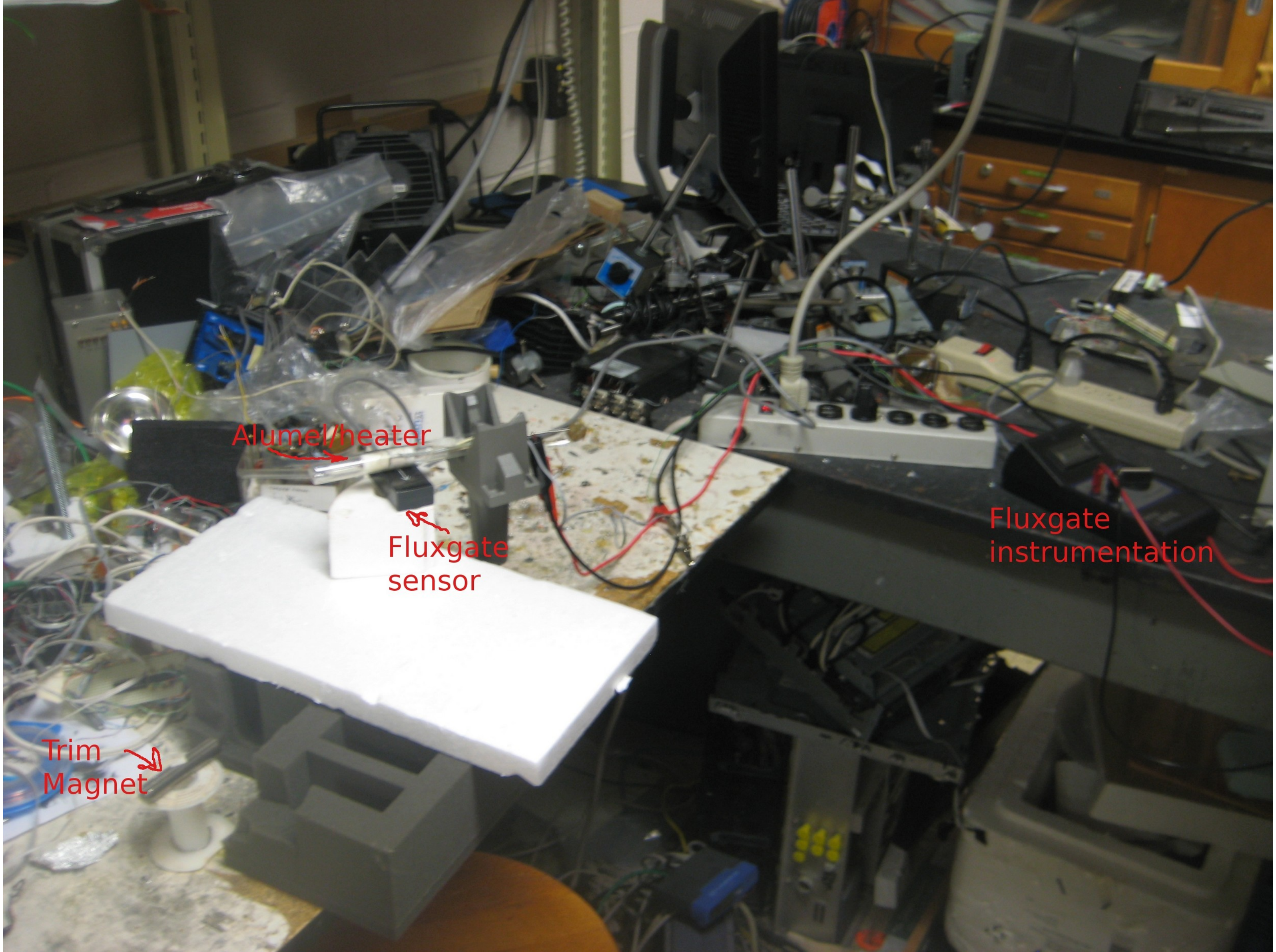
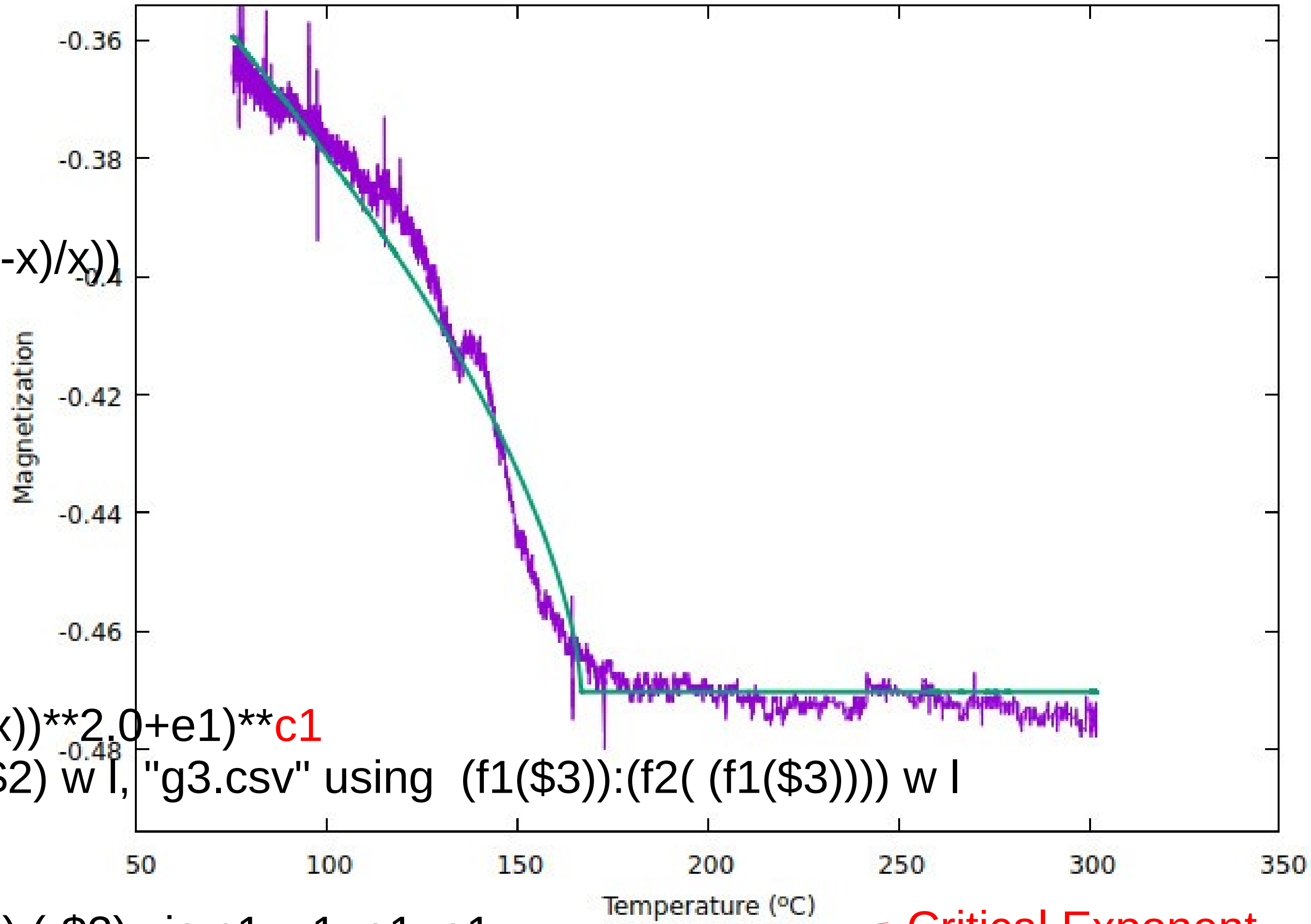

Alumel/heater
Fluxgate sensor
Fluxgate instrumentation
Trim Magnet

Temperature Calibration:
f1(x) =
1.0/(.0055+.0028*log(2.5*(1.46-x)/x))



e1 = 3e-5
f2(x) = a1+b1*((x1-x+abs(x1-x))**2.0+e1)**c1
plot "g3.csv" using (f1($3)):(-$2) w l, "g3.csv" using (f1($3)):(f2((f1($3)))) w l

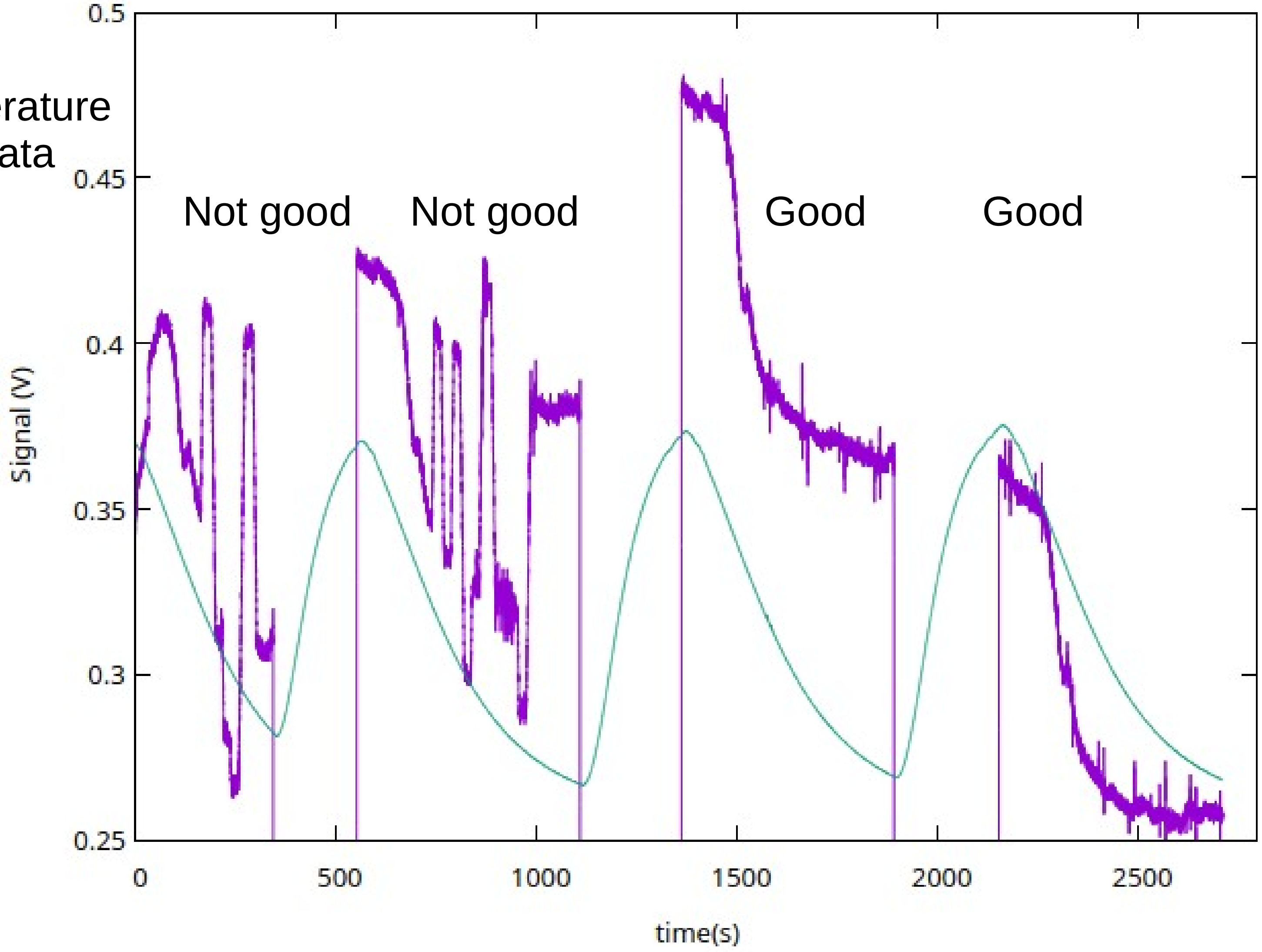
fit f2(x) "g3.csv" using (f1($3)):(-$2) via c1, x1, a1, e1

c1	= 0.318998	+/- 0.0002447	(0.07671%)
x1	= 166.78	+/- 0.1671	(0.1002%)
a1	= -0.470336	+/- 0.0003449	(0.07332%)

Critical Exponent
Transition Temperature

Raw Data

Purple = mag
Green = temperature data



This lab works great!!

Here are some references to add to the new writeup:

---for alumel magnetization-----
r.a.bonilla and d. pena lara,
revista mexicana de fisica s. 58, (2) 6063, (2012)
e.ortiz, j.f. jurado and r.a.vargas,
journal of alloys and compounds. 243, 82-84 (1996)
j. l. horton, t.g. kollie and l.g.rubin,
j.appl.phys. 48,4666 (1977).

They all give the transition around 430K or so, which corresponds to about 2KOhms ro so on the thermistor.
Very reproducible. Gives reasonable exponents. Nice!

SEE ALSO : PHYSICAL REVIEW B 92, 024409 (2015)
Three-dimensional Ising critical behavior in R0.6 Sr 0.4 MnO3 (R = Pr, Nd) manganites
A. Oleaga, et. al.

OLD NOTES: Ignore...just for historical completeness of this lab

You can use the following function to convert the thermistor readings to temperature readings:

$$T(R) = 1/(.0055+.0028*\log(R))$$

where the resistance is in KiloOhms. Here's an associated temperature vs time (red) with the scaled magnetization curve (green).

This will be a very interesting one to analyze!!! You may have to smooth over the bumps to get a good fit with a non-analytic power law. Peace, -Dr. C.

These are the field/temperature data for two different runs for the alumel magnetization as it cools. Works pretty well, but depends somewhat on the geometry of the sensor head/sample/trim magnets. etc.