Estamos en el Pabellón 1 de Ciudad Universitaria, por empezar la clase de la materia Superconductividad, y nos preguntamos:

Dónde está Santiago Maldonado?

Campos críticos

Campo crítico termodinámico H_c

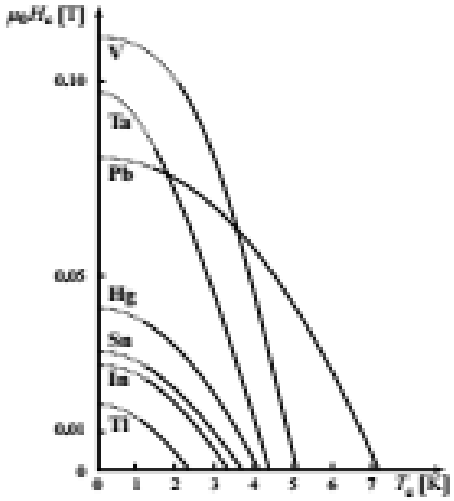


Figure 4.6
Critical field lines of common metallic superconductors of type I (from D. Shoenberg, 1952, © Cambridge University Press)[8]

Table 4.4 - Critical temperatures T_c at zero field, critical fields $H_c(0)$ at zero temperature and slopes of the critical field as a function of temperature, seen in some pure metals[5]

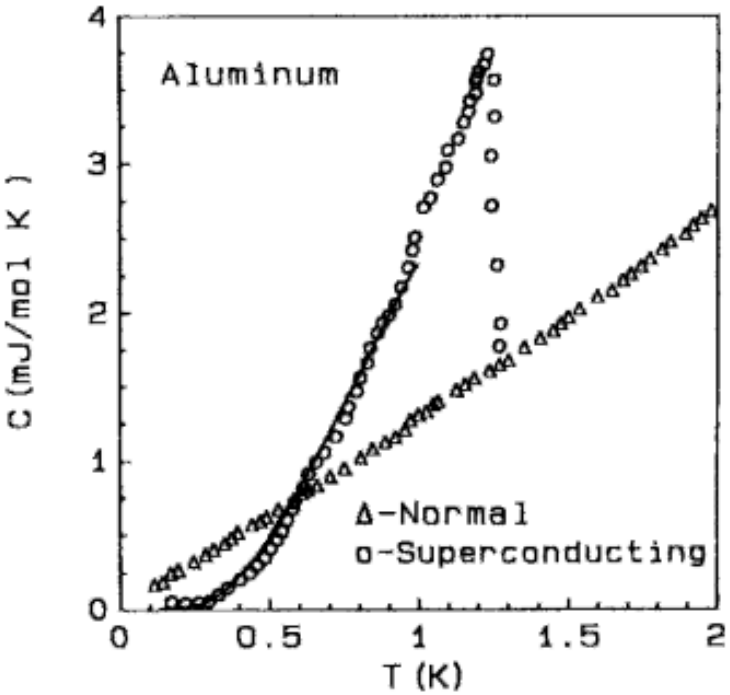
Element	Al	Cd	Ga	La	Nb*	Pb	Sn	Ta	V*
T_c [K]**	1.175	0.517	1.083	4.880	8.250	7.196	3.720	4.470	5.400
$\mu_0 H_c(0)$ [mT]	10.6	2.88	5.03	103	196	81.2	30.7	86	134
$-\mu_0 \left.\frac{dH_c}{dT}\right\|_{T_c}$ [mT K^{-1}]	16.3	8.6	9.3	–	–	22.6	14.7	33.4	48.2

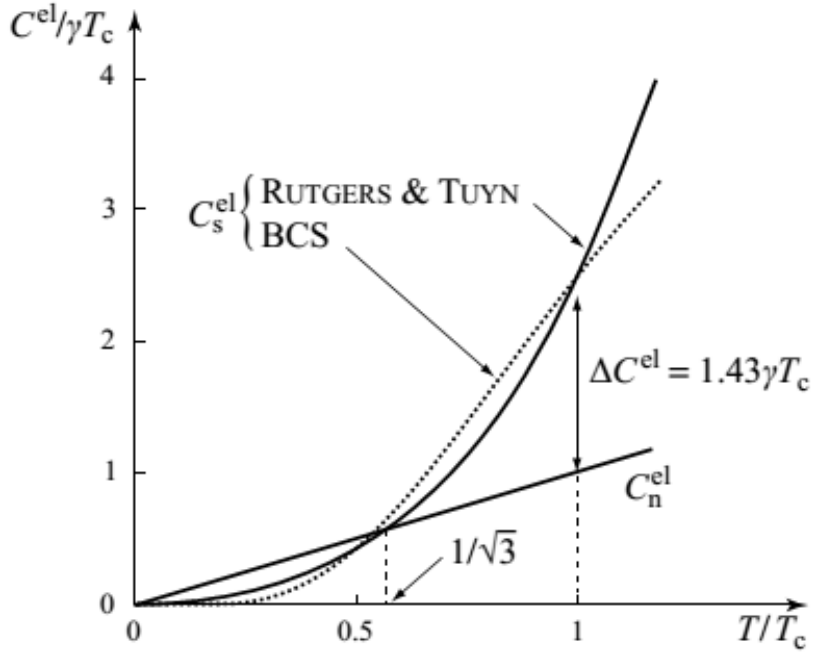
* Niobium and vanadium are type II superconductors.
** *http://www.superconductors.org/type1.htm*

Z	Element[b]	T_c (K)	B_c (mT)
4	Be	0.026	
13	Al	1.18	10.5
21	Sc	0.01	
22	Ti	0.40	5.6
23	V	5.40	141.0
30	Zn	0.85	5.4
31	Ga	1.08	5.83
40	Zr	0.61	4.7
41	Nb	9.25	206.0
42	Mo	0.92	9.6
43	Tc	7.8	141.0
44	Ru	0.49	6.9
48	Cd	0.517	2.8
49	In	3.41	28.2
50	Sn(w)	3.72	30.5
57	La(α)	4.88	80.0
57	La(β)	6.3	110.0
71	Lu	0.1	<35.0
72	Hf	0.13	1.27
73	Ta	4.47	82.9
74	W	0.015	0.12
75	Re	1.70	20.0
76	Os	0.66	7.0
77	Ir	0.11	1.6
80	Hg(α)	4.15	41.1
80	Hg(β)	3.9	33.9
81	Tl	2.38	17.8
82	Pb	7.20	80.3
90	Th	1.38	16.0
91	Pa	1.4	
95	Am	1.0	

Termodinámica

Calor específico: discontinuidad con H = 0





$$\Delta C = 4\mu_0 H_c^2(0)/T_c$$

Table 4.5 - Specific heat jump at the superconducting transition in zero field [5]
Direct measurement (by calorimetry) and indirect determination by measurement of $H_c(T)$ (magnetometry) and application of equation (4.32)

Material	Sn	In	Tl	Ta	Pb
T_c [K]*	3.72	3.41	2.38	4.47	7.2
$C_s^{el} - C_n^{el}$ [10^{-3} J mol^{-1} K^{-1}] Calorimetric measurement	10.6	9.75	6.2	41.5	52.6
$C_s^{el} - C_n^{el}$ [10^{-3} J mol^{-1} K^{-1}] Magnetic measurement	10.6	9.62	6.15	41.6	41.8

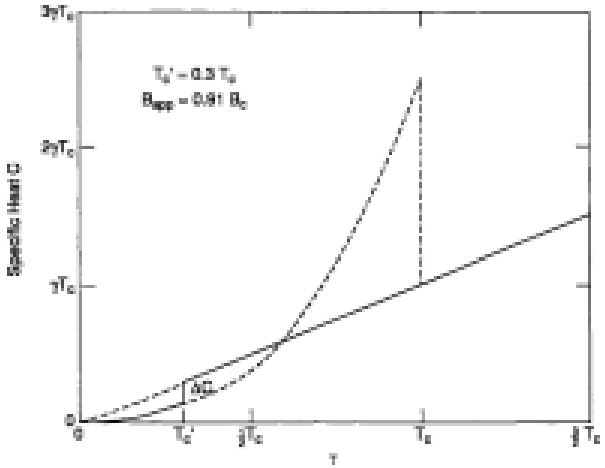


Figure 4.12 Temperature dependence of the specific heat in the normal and superconducting states in the presence of a strong applied magnetic field. The downward jump in specific heat ΔC at T_c' is indicated.

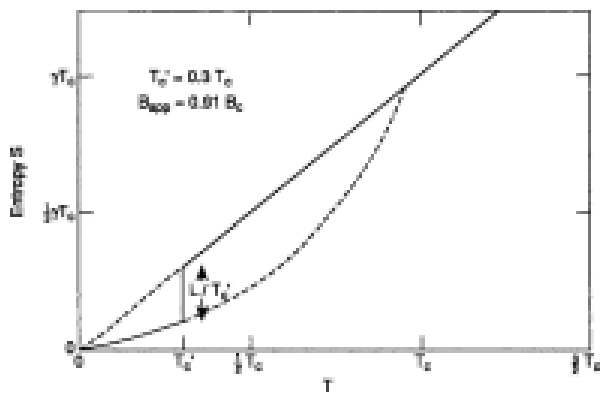


Figure 4.13 Temperature dependence of the entropy in the normal and superconducting states in the presence of a strong applied magnetic field. The latent heat factor L/T_c' of the jump in entropy at T_c' is indicated.

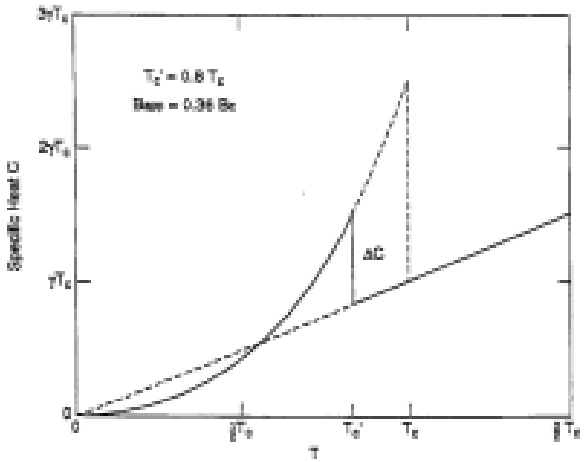


Figure 4.16 Temperature dependence of specific heat in the normal and superconducting states in the presence of a weak applied magnetic field. The jump in specific heat ΔC at T_c' is upward, in contrast to the downward jump shown in Fig. 4.12 for the high-field case.

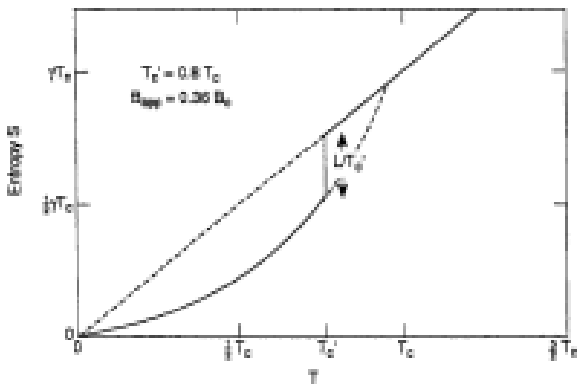


Figure 4.17 Temperature dependence of entropy in the normal and superconducting states in the presence of a weak applied magnetic field showing the jump in entropy L/T_c' at T_c', as expected for a first-order transition.

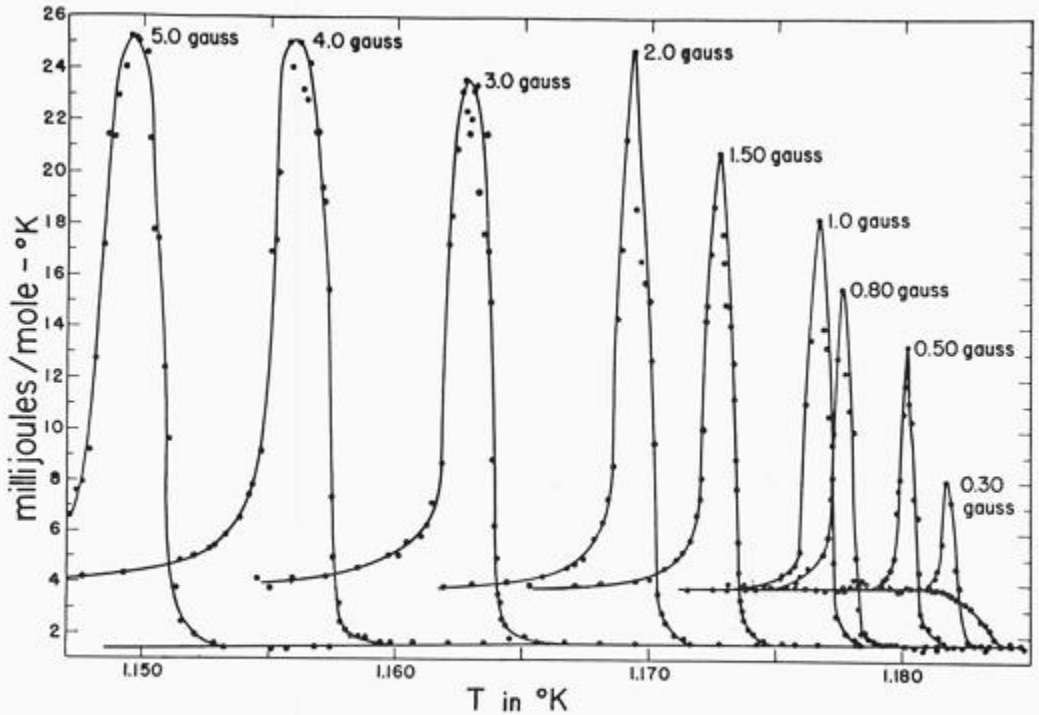
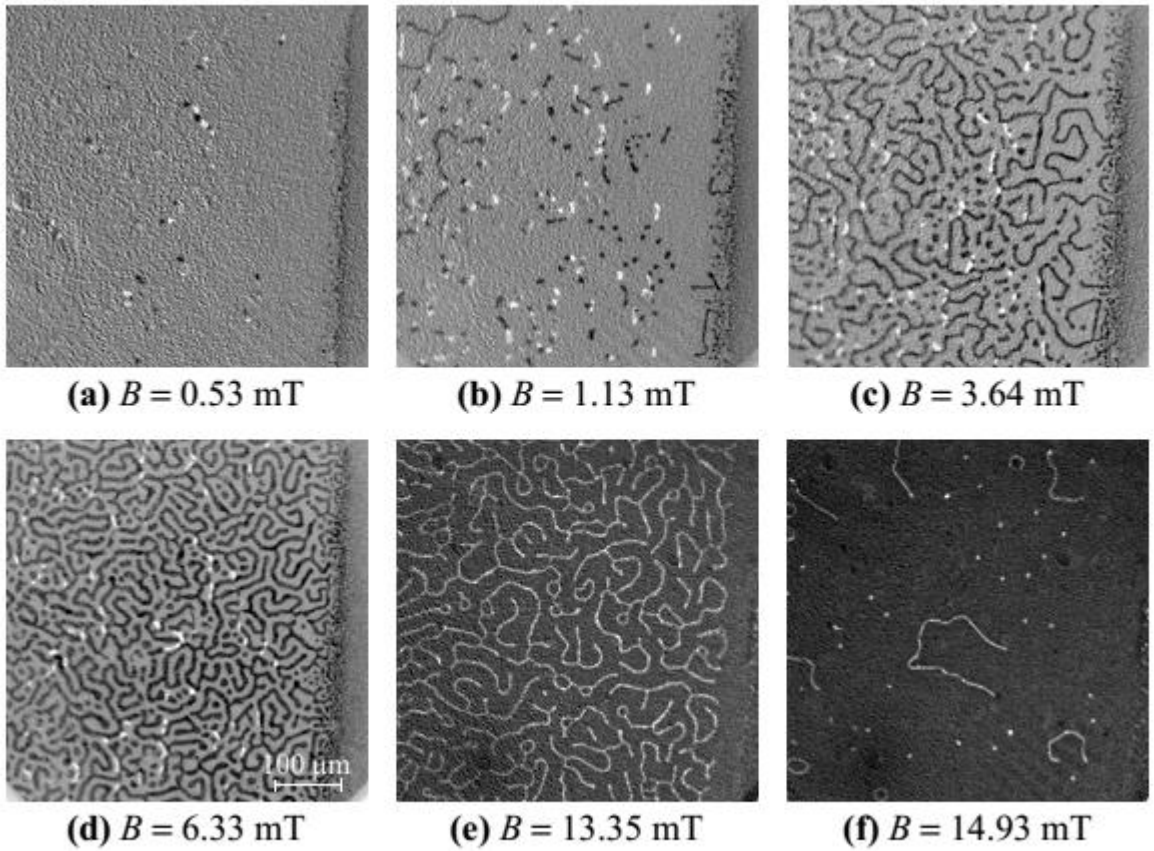


Fig. 3. The specific heat for sample Al III in fields up to 5 gauss. The sharpening of the transition when the field is increased from 0 to 0.3 gauss can be seen clearly.

Estado intermedio



(a) $B = 0.53$ mT **(b)** $B = 1.13$ mT **(c)** $B = 3.64$ mT

(d) $B = 6.33$ mT **(e)** $B = 13.35$ mT **(f)** $B = 14.93$ mT

Figure 5.10 - Intermediate states of a slab of indium under increasing field at $T = 1.9$ K