

## Notes:

**Homework :** Set #10 I will post today, due next Tuesday.

Note, this is canceled, our Wednesday class will meet as scheduled.

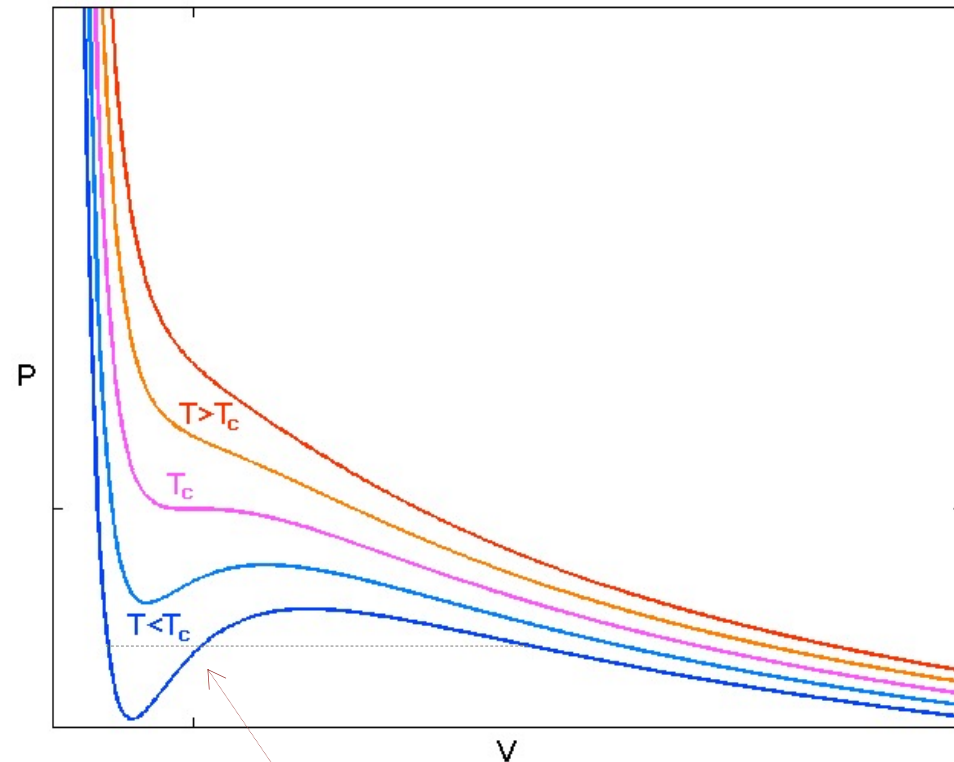
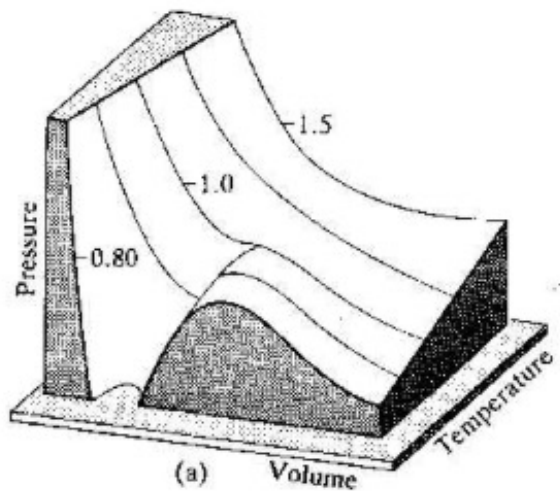
**Tomorrow:** ~~I have a jury duty call.~~ It is likely I won't get picked to serve, but watch for an announcement before class just in case. I *do* expect to have class; will have to make up later if not. On Thursday I would arrange for a substitute in unlikely case that I can't be here.

**Thursday:** Continue with chapter 18 after completing chapter 9.

## Phase Transformations:

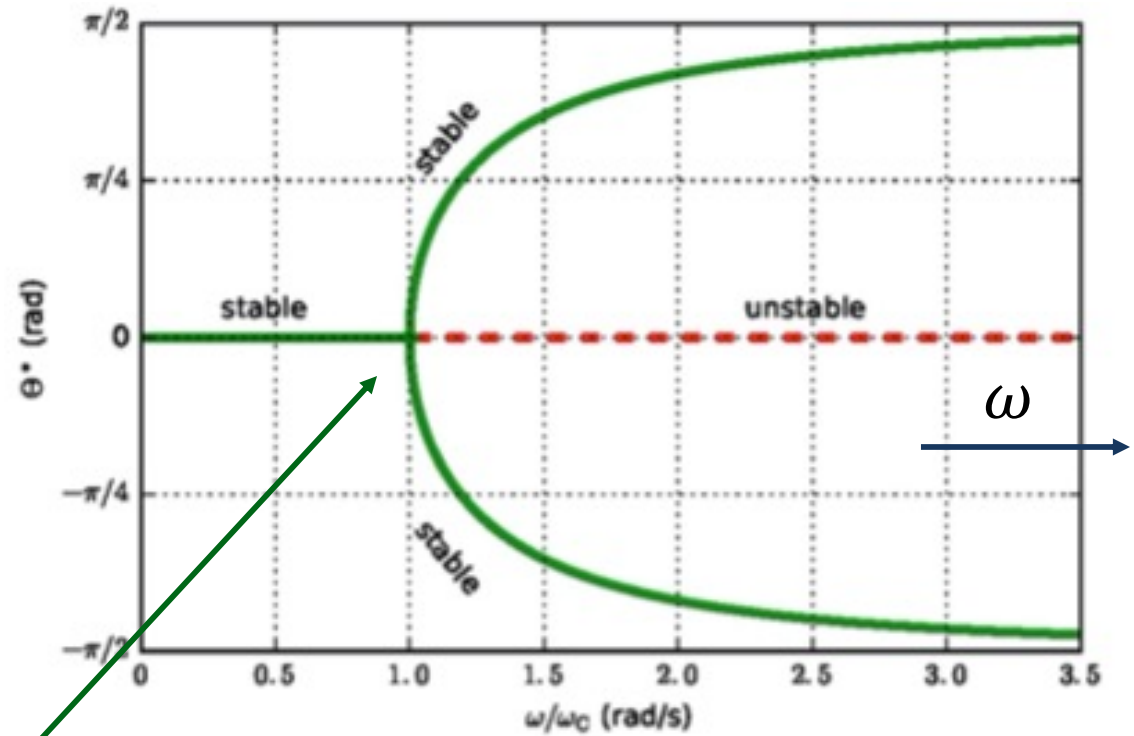
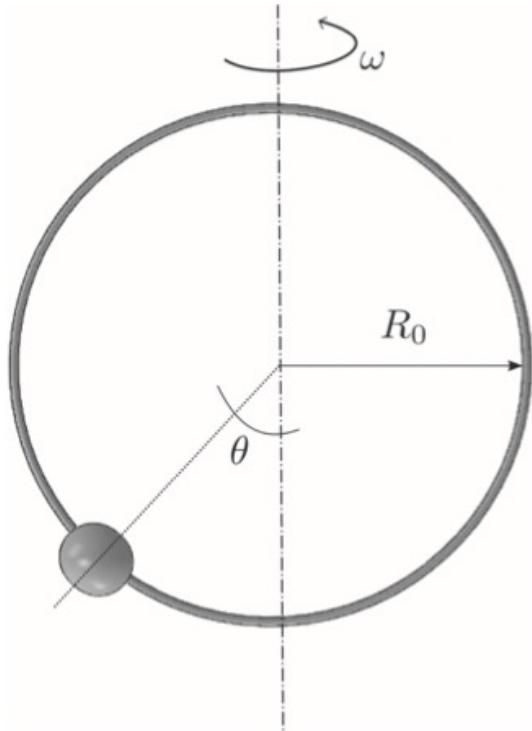
- Van der Waals gas: Recall that critical-point  $P$ ,  $V$ ,  $T$  were considered in an earlier homework.

$$\left[ P + a \left( \frac{n}{V} \right)^2 \right] \left( \frac{V}{n} - b \right) = RT$$



$T < T_c$ , always exist unstable points

# Bifurcation instability in mechanics:

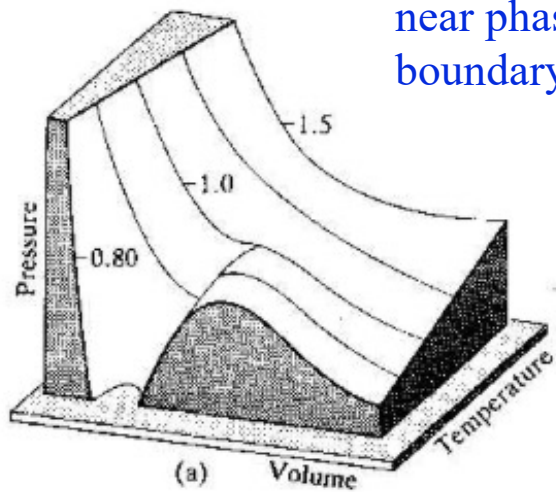


Symmetry breaking akin to  
2<sup>nd</sup> order phase transition

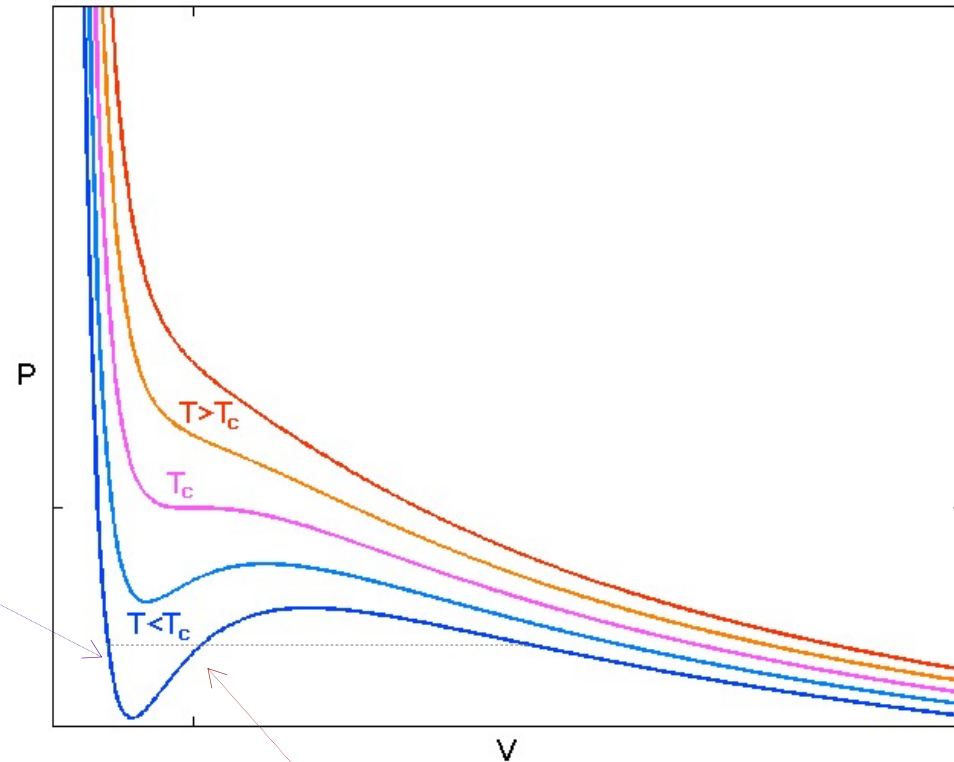
Raviola et al. Eur. J. Phys.  
38 (2017) 015005

# Phase Transformations:

$$\left[ P + a \left( \frac{n}{V} \right)^2 \right] \left( \frac{V}{n} - b \right) = RT$$



Hysteresis near phase boundary



$T < T_c$ , always unstable point

Maxwell construction (equal areas): phase boundaries

$$dG = -SdT + VdP$$