

Blatt 1 - Aufgabe 3: Stacking diagrams

The three types of boundaries in a stacking diagram are asymptotic terminal lines (see Fig. 1), terminal lines (see Fig. 2), and sedimentation binodals (see Fig. 3). Once all boundaries of the stacking diagram have been identified we can select specific points (sedimentation paths) inside each region and read the stacking sequence using the bulk phase diagram (see Figs. 4 and 5).

Further reading

- [1] *The phase stacking diagram of colloidal mixtures under gravity*, D. de las Heras, and M. Schmidt, *Soft Matter*, **9**, 8636, (2013).
- [2] *Sedimentation stacking diagram of binary colloidal mixtures and bulk phases in the plane of chemical potentials*, D. de las Heras, and M. Schmidt, *J. Phys: Condens. Matter*, **27**, 194115, (2015).
- [3] *The role of sample height in the stacking diagram of colloidal mixtures under gravity*, T. Geigenfeind, and D. de las Heras, *J. Phys: Condens. Matter*, **29**, 064006, (2017).

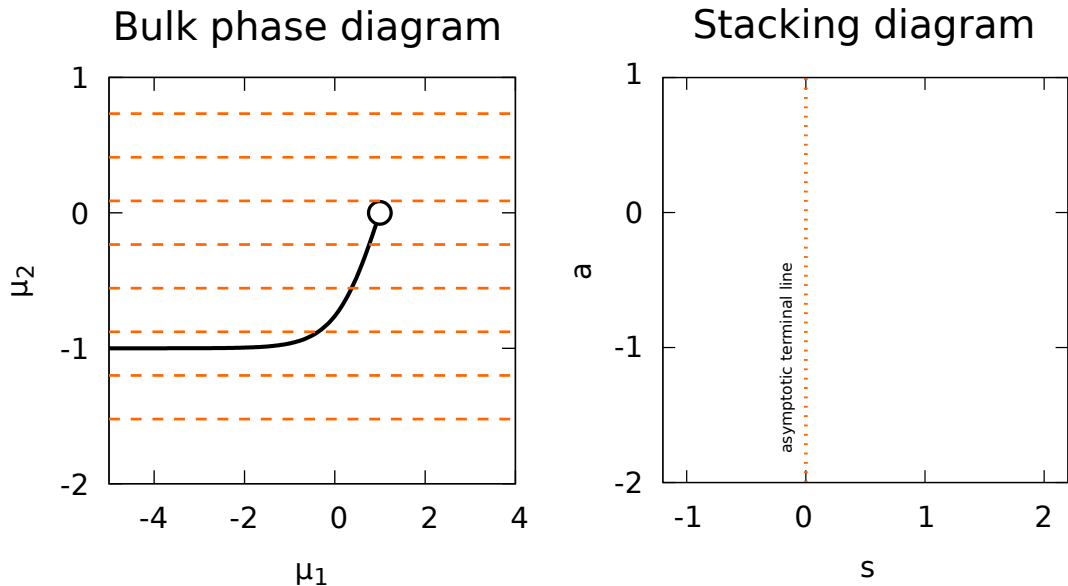


FIG. 1: Bulk phase diagram (left) and partial stacking diagram (right). Selected sedimentation paths parallel to the asymptotic behaviour of the binodal line are represented in the bulk phase diagram. The set of all these paths form the asymptotic terminal line in the stacking diagram.

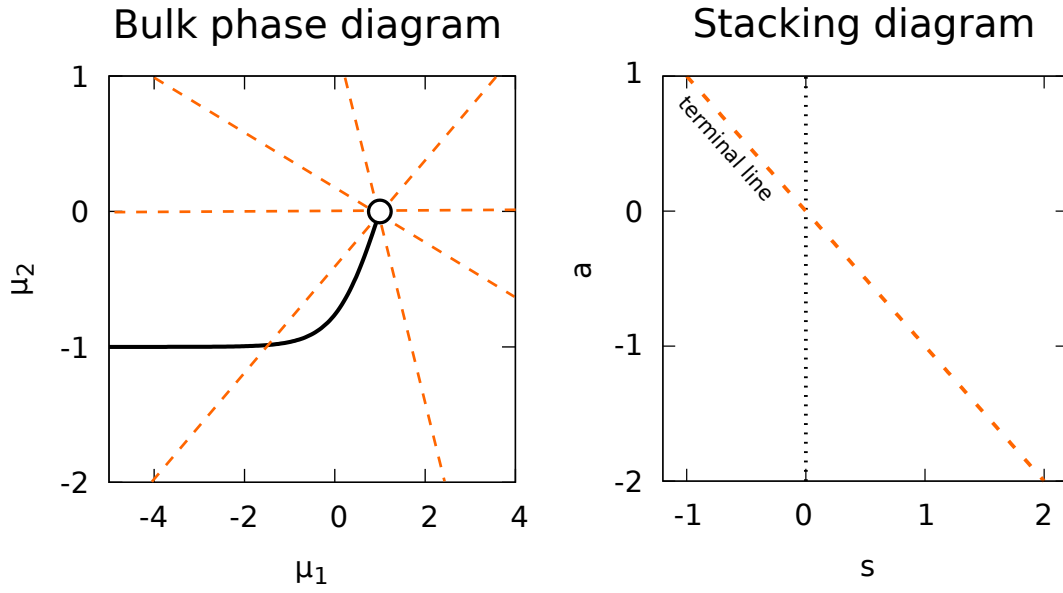


FIG. 2: Bulk phase diagram (left) and partial stacking diagram (right). Selected sedimentation paths crossing the critical point (ending point of the binodal) are represented in the bulk phase diagram. The set of all these paths form the terminal line in the stacking diagram.

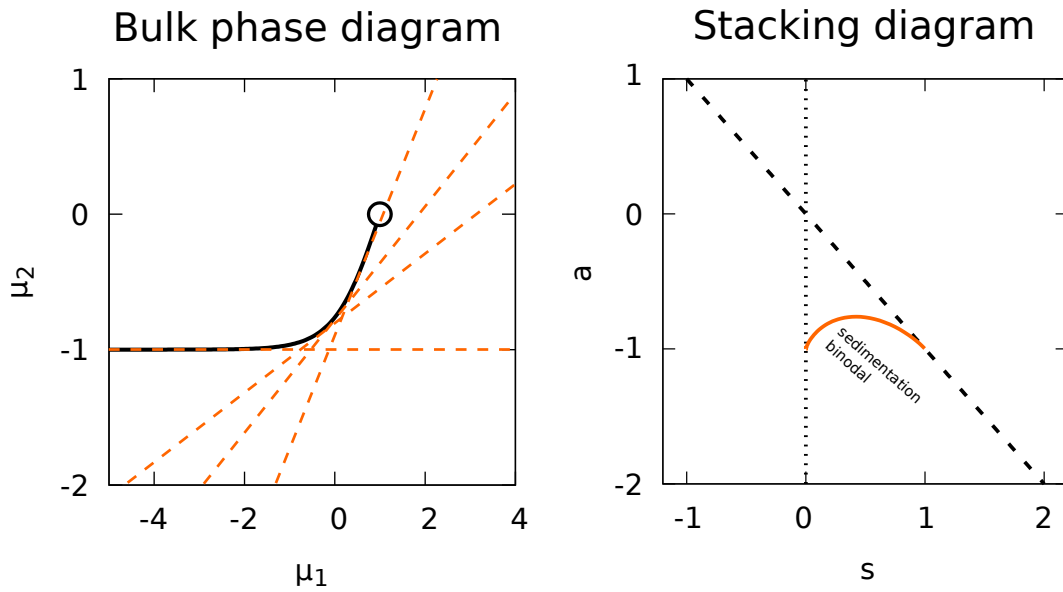


FIG. 3: Bulk phase diagram (left) and partial stacking diagram (right). Selected sedimentation paths tangent to the binodal line are represented in the bulk phase diagram. The set of all these paths form the sedimentation binodal in the stacking diagram.

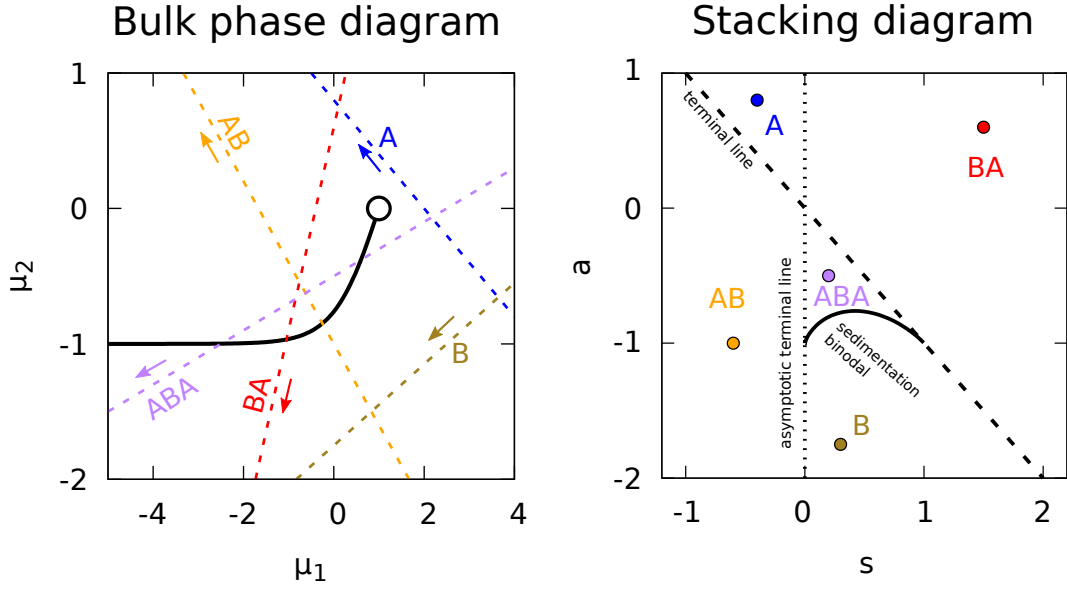


FIG. 4: Bulk phase diagram (left) and complete stacking diagram (right). One selected sedimentation path for each possible stacking sequence is represented in the bulk phase diagram (dashed-lines) and in the stacking diagram (circles). The arrows of the paths in the bulk phase diagram indicate the direction from bottom to top of the sample. The stacking diagram assumes $m_1 > 0$. In the stacking diagram for the case $m_1 < 0$, the only change is that the sequences have the reverse order, e.g. AB instead of BA .

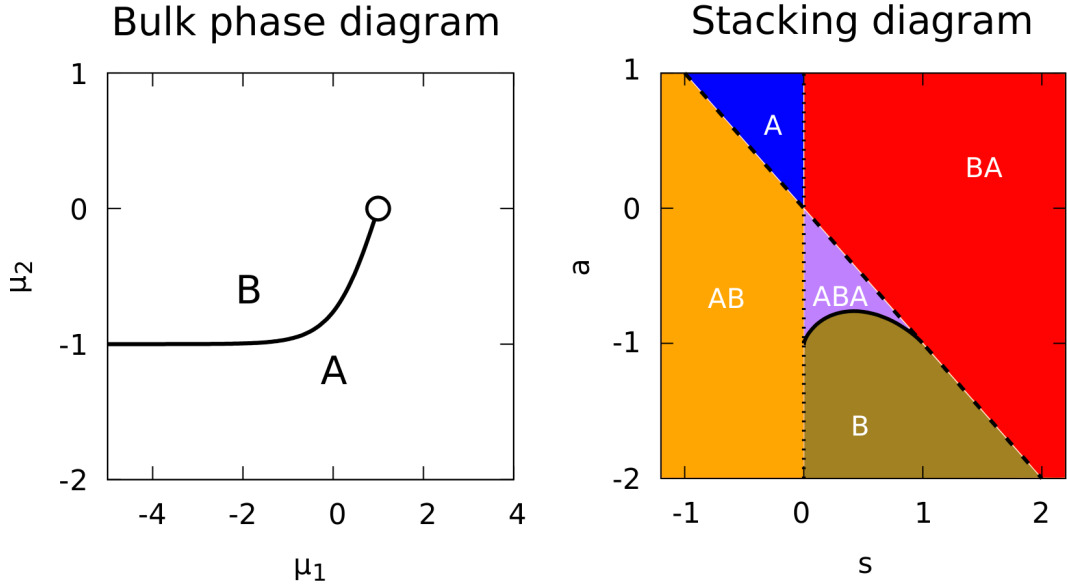


FIG. 5: Bulk phase diagram (left) and stacking diagram (right) for the case $m_1 < 0$.