7.3: Polar Lattice

The **polar lattice** is a lattice dual of the direct lattice, which is the ancestor of the reciprocal lattice. It was introduced by Auguste Bravais in a " mémoire" presented to the *Académie de Sciences de Paris* on 11 December 1848.

The construction of the polar lattice is essentially the same as that of the reciprocal lattice, but the parameter along a row of the polar lattice is $V^{2/3}/d(hkl)$ instead of $1/d(hkl)$. The polar lattice has thus the same dimensions as the direct lattice, namely Ångstroms, instead of Ångstroms^{-1}, like the reciprocal lattice.

- The unit cell of the polar lattice has the same volume as that of the direct lattice.
- The scalar product of the basis vectors of the direct and polar lattice is $V^{2/3}\delta_{ij}$, where δ is **Kroneker's tensor** and the indices i and j point to the basis vectors.

The polar lattice was introduced to facilitate the morphological study of crystals.