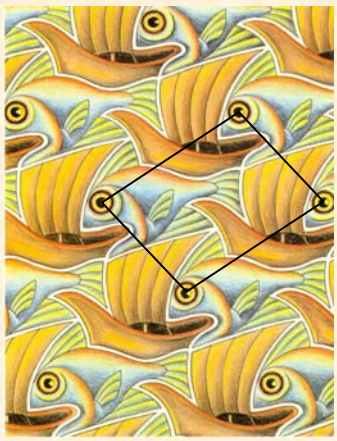
kristallen: translatie symmetrie

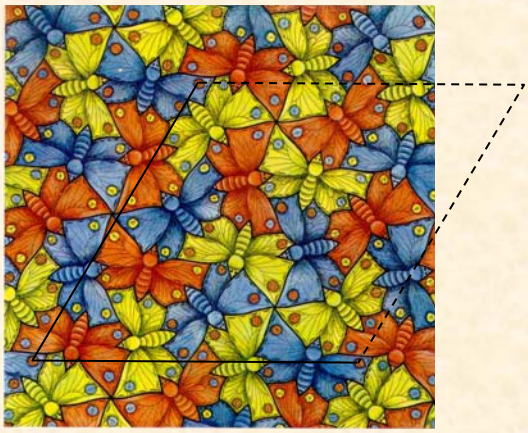
Escher



wel een kristal

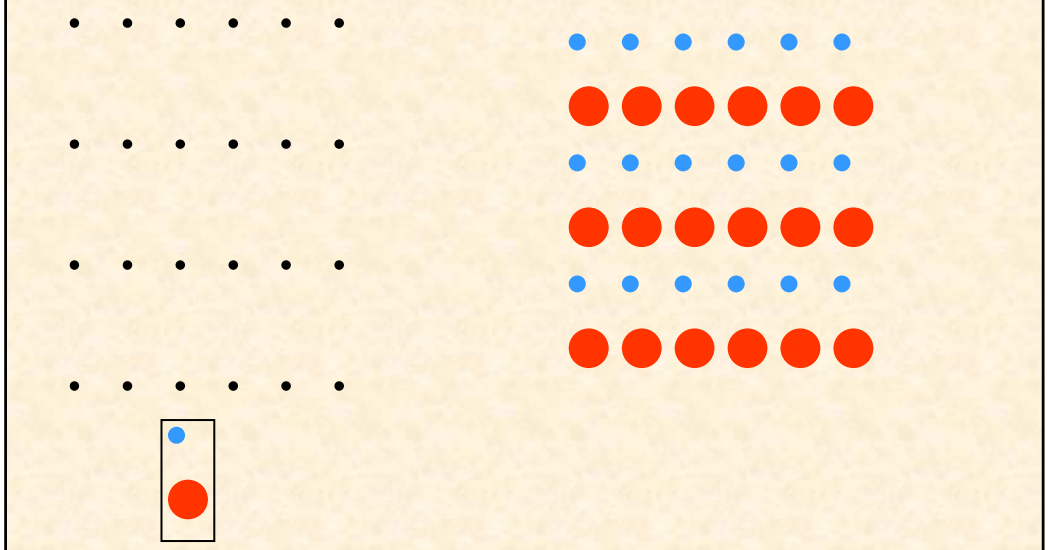
geen kristal

translatiesymmetrie

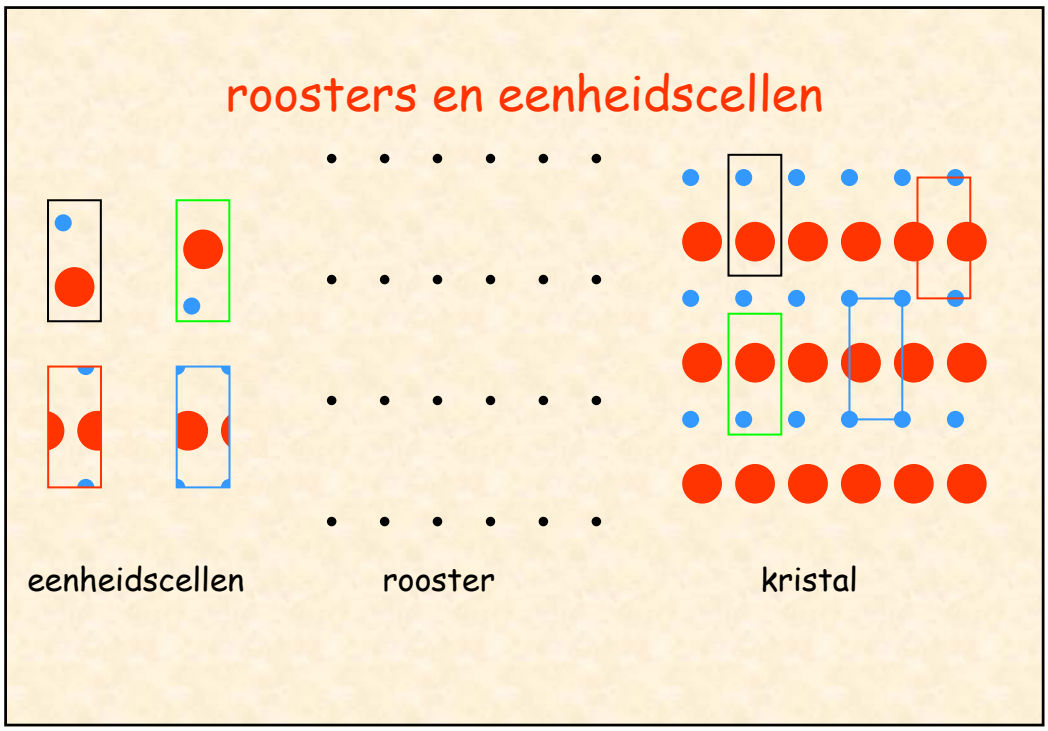


3 dimensionaal kristal

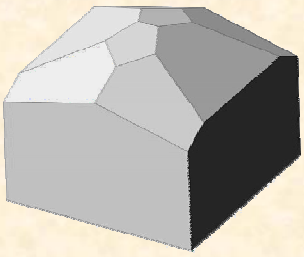
roosters + eenheidscellen



roosters en eenheidscellen

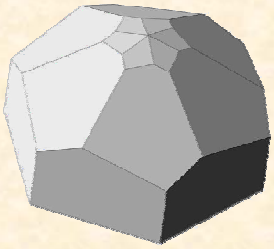


Symmetrie



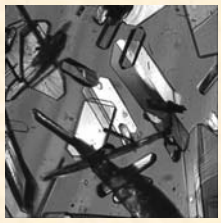
orthorombisch

puntgroep mm2



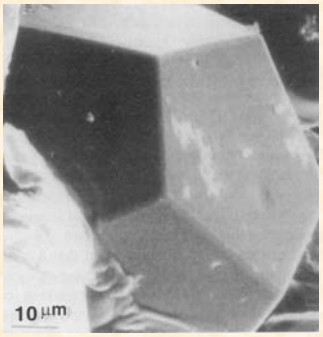
hexagonaal

puntgroep 6m

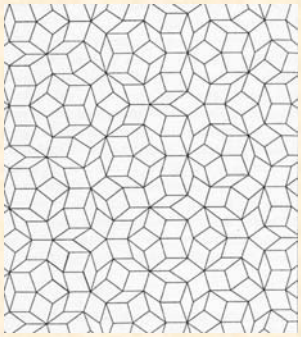


symmetrie van eenheidscel is zichtbaar aan de buitenkant

Quasi-kristallen

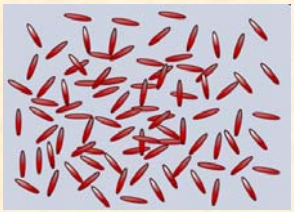


legering van $Al_{0.65}Cu_{0.25}Fe_{0.11}$



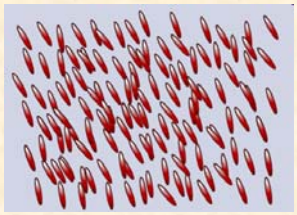
- 5-voudige rotatie symmetrie,
- geen translatie symmetry
- "Penrose tiling"

Vloeibare kristallen



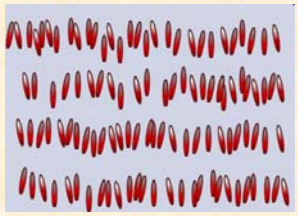
isotrope fase

vloeistof



nematische fase

oriëntatie ordening



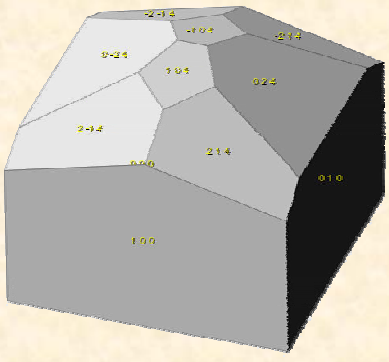
smectische fase

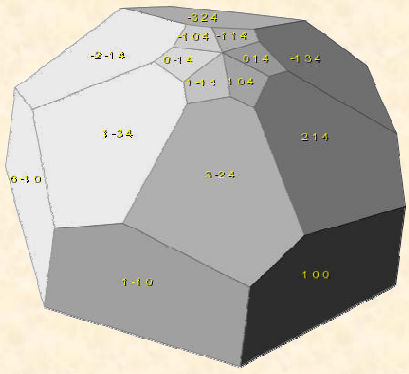
oriëntatie ordening +

translatie ordening

From: birgeneau.berkeley.edu/lxtaltest.php

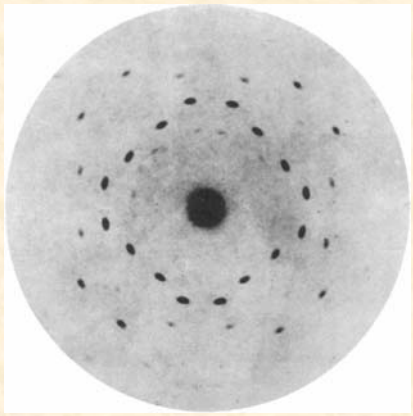
Miller indices



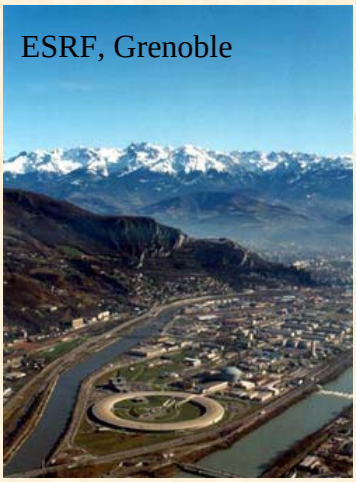


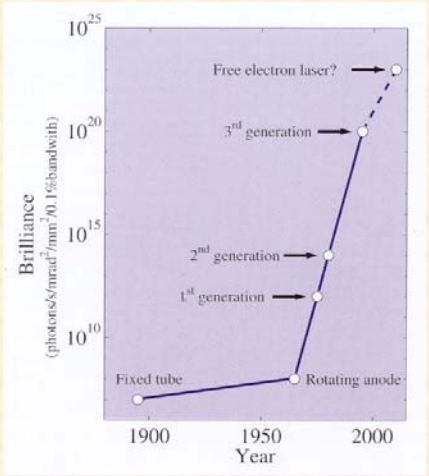
Eerste röntgendiffractie opname

- Eén van de 'Laue' opnames gemaakt door Friedrich, Knipping & Von Laue, 1912.
- 4-tallige symmetrie zichtbaar van dit ZnS kristal



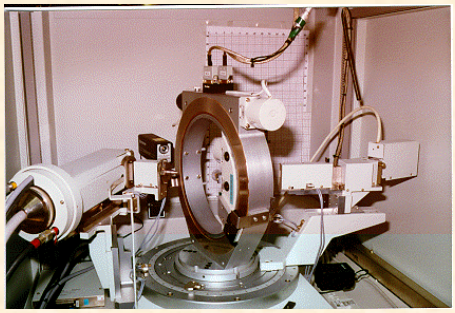
Synchrotron straling





factor 10^{10} beter!

Diffractometers



eenkristal diffractie

poederdiffractie

Simulations for Solid State Physics

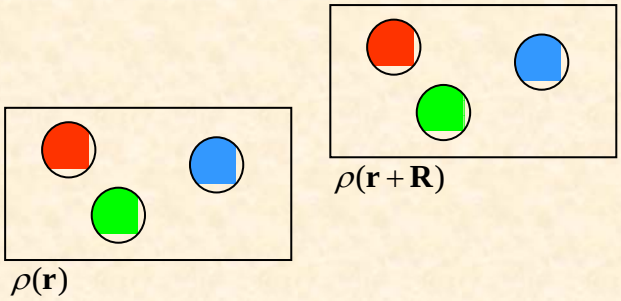
- http://pages.physics.cornell.edu/sss/
  - "Bravais"

Patterson functie

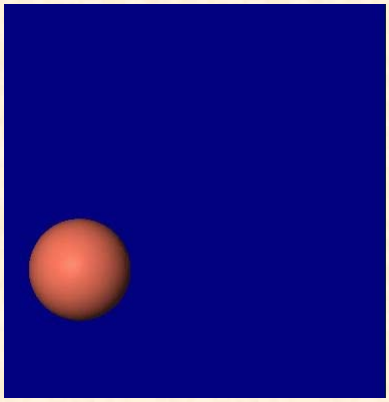
$$P(\mathbf{R}) = \int \rho(\mathbf{r})\rho(\mathbf{r}+\mathbf{R})d\mathbf{r} = \frac{1}{V}\sum_{hkl}|F_{hkl}|^2 e^{-2\pi i(hx+ky+lz)}$$

autocorrelatie functie

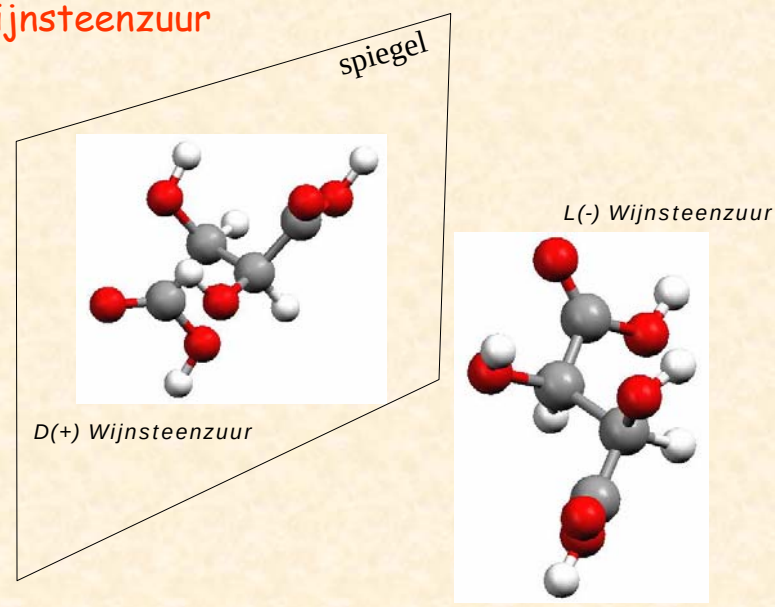
alleen intensiteit



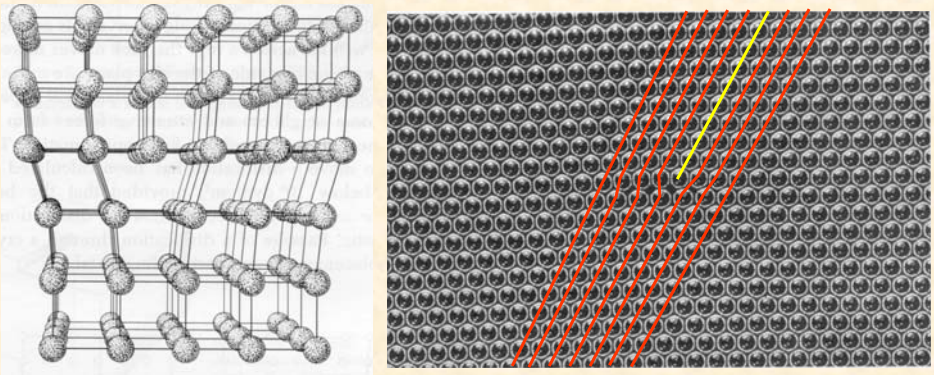
van dichtste bollen naar kubisch



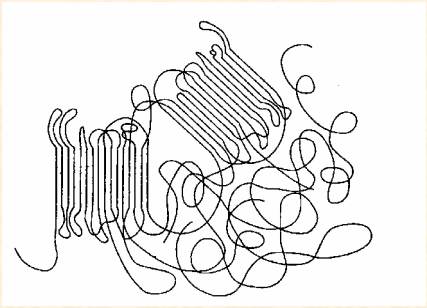
enantiomeren van wijnsteenzuur



randdislocatie



polymeer



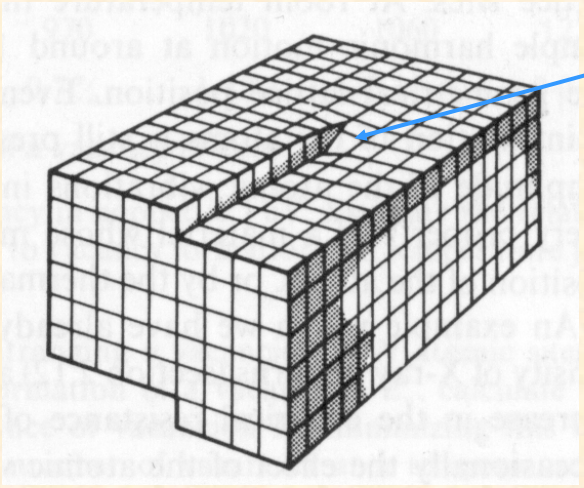
kristallijne + amorfe domeinen

Magnetische levitatie

kikker = diamagnetisch

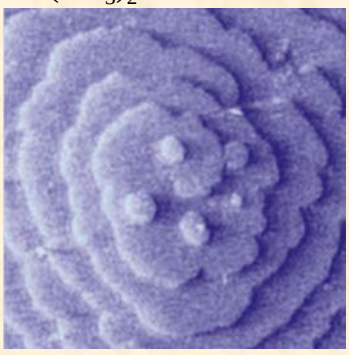
HFML, Nijmegen

Schroefdislocatie



Groeispiralen

$Ba(NO_3)_2$



n-$C_{40}H_{82}$ paraffine

AFM opnames, M. Plomp