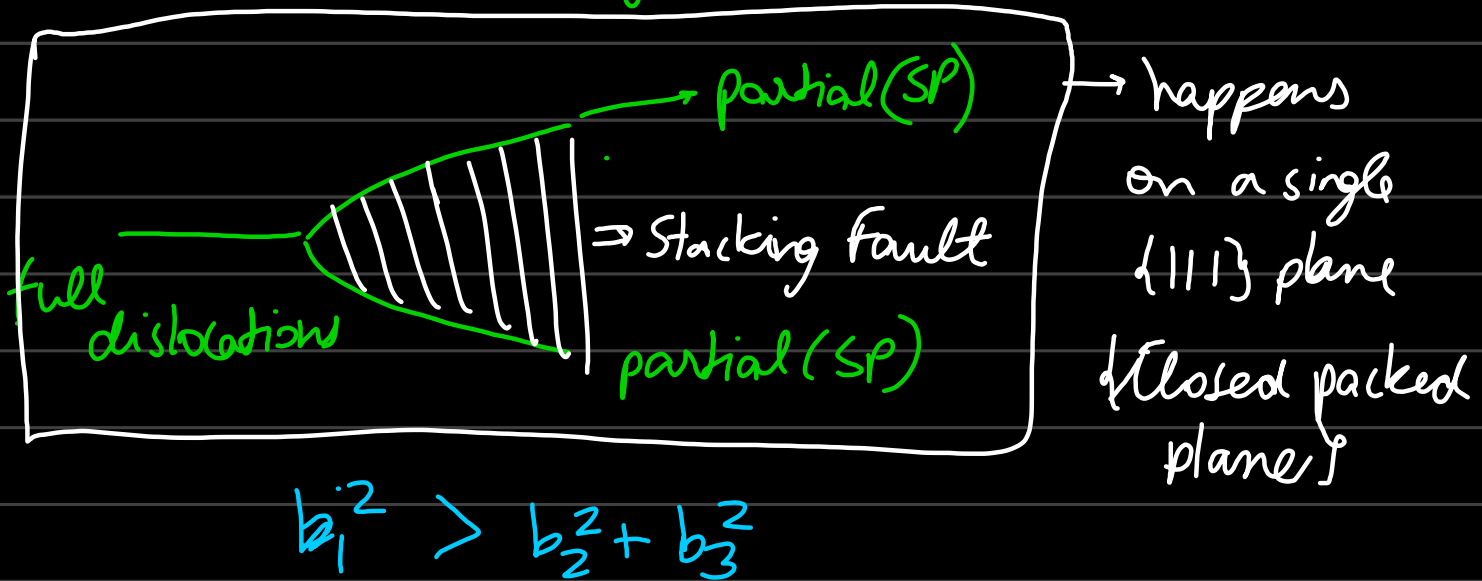


Lecture 13

$$\frac{1}{2} [1\bar{1}0] \longrightarrow \frac{1}{6} [211] + \frac{1}{6} [1\bar{2}\bar{1}]$$

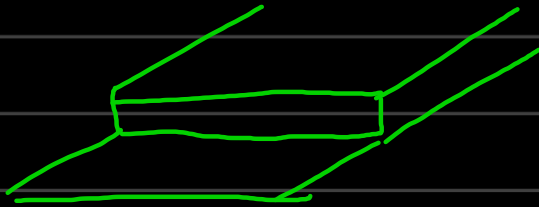
Shockley partials (SP)



Climb! non-conservative motion:

↳ dislocations moves by movement of vacancies.

Jogs: steps on the dislocation



- * Jogs on edge dislocations do not impede glide
- * Jogs on screw dislocations has an edge character (b ⊥ line) thereby impedes movement.

Kinks: translation/break in dislocations on same slip plane.

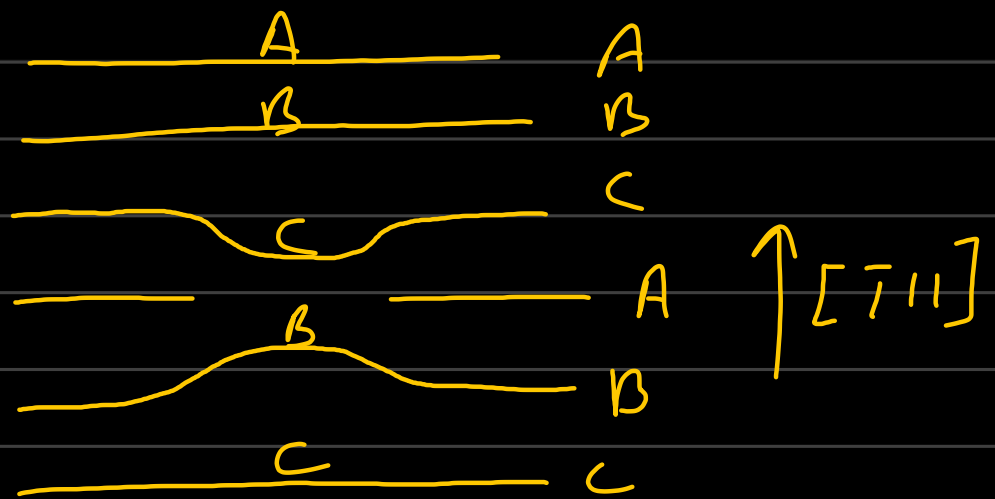
- * kinks in both edge and screw dislocations do not impede glide motion.

Cross slip: * Only the screw component is free to glide on any plane in case of a dislocation loop.

→ The edge component remains pinned.

→ The constrictions are screw in character for cross slip of stacking faults.

* Frank Partial:



→ An edge dislocation forms here of burgers vector $\frac{a_0}{3} [111]$

↳ $\vec{b} \perp$ slip plane \Rightarrow dislocation is immobile or sessile

→ dislocations which glide freely over slip planes such as perfect dislocations or SP partials are glissile.

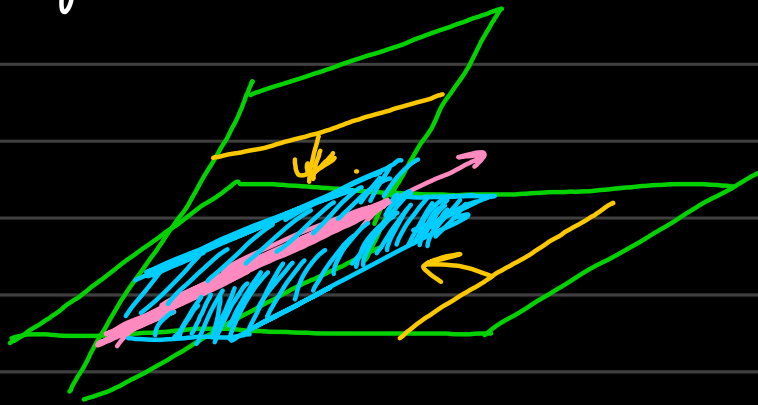
→ Condensation of vacancies on slip planes leads to formation of such stacking faults and sessile dislocations.

(creation of disk of vacancies)

→ Observed in nuclear materials such as Zr,

* Lomer-Cottrell barrier:

↳ sessile dislocations produced in the fcc lattice by glide of dislocations on intersecting (111) planes.



$$\frac{a_0}{2}[101] + \frac{a_0}{2}[\bar{1}10] \rightarrow \frac{a_0}{2}[011]$$

↓
on $[100]$ plane

which is not a glide plane.

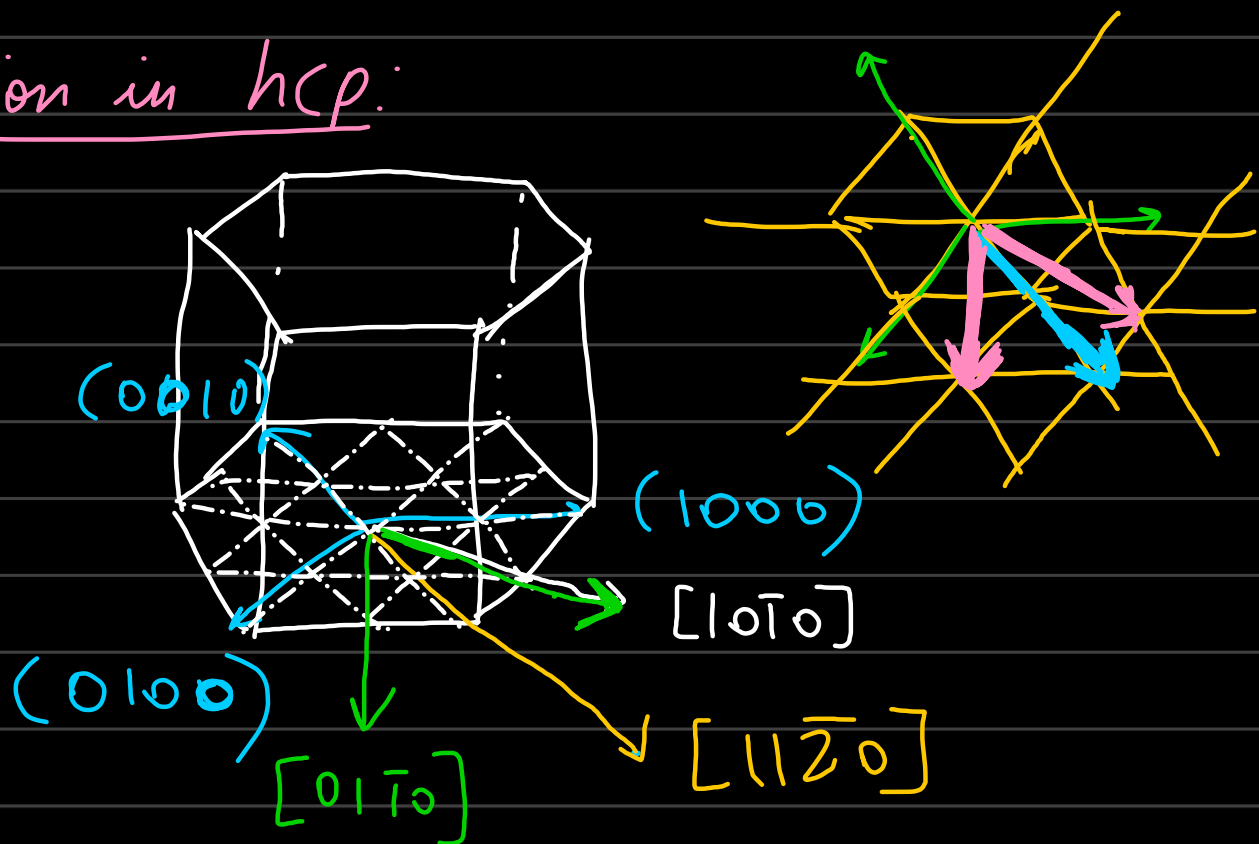
→ $\vec{b} \perp$ to line of intersection: dislocation is sessile.

→ Although $\frac{a_0}{2}[011]$ is not a Frank partial.

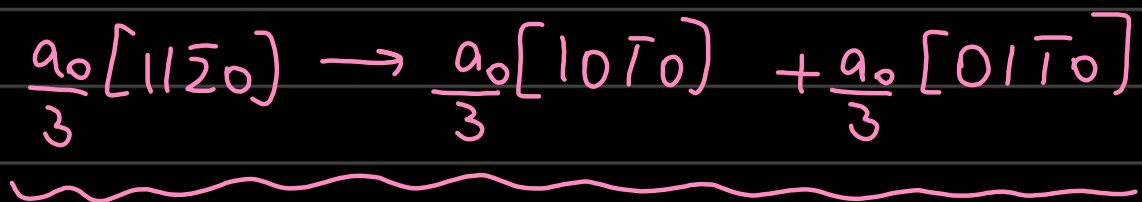
↳ hence cannot be strictly called sessile
 ↳ if it is a complete dislocation.

→ $\frac{a_0}{6}[011] \rightarrow$ imperfect dislocation
 ↳ definitely sessile.

Dislocation in hcp:



Dislocation dissociation reaction in hcp is



↳ Stacking faults produced by this reaction lie on the basal plane & extended dislocations are

Confined to glide on basal plane.