

## Alignment Procedure for the Philips CM20

- Liquid Nitrogen / High tension (**HT**) - **On**
- Check **Vacuum** (P1 < 30-38, P3 < 40, IGP < 25)
- Reset beta tilt to 95.
- Before inserting the specimen holder, make sure that the objective aperture is out.
- Insert Double tilt holder
  - O-ring clean ?
  - Sapphire crystal at the tip clean? (You may wipe it with a lens paper.)
  - Introduce *parallel to the axis*, with pin pointing at 5:30
  - Rest position: 0907

## Illumination System

- Select condensor aperture  
(often, large apertures do *not* yield optimum results)
- Start automatic filament heating (**Configuration**)
- Find the beam
  - overfocus C2
  - move specimen
- Adjust eucentric height (magnification 20-40K)

- **Focus Ob** (without **objective** aperture) to set **optimum** focal length
- Center C2 aperture
  - over- and underfocus C2
  - shift C2 aperture at overfocus to move beam position at distance 1/2 way towards the position you observed at underfocus
- Condensor Stigmator
  - desaturate filament (2-3 clicks)
  - use **STIG Cond** to obtain a sharp image of the undersaturated filament
- Gun Tilt
  - Desaturate filament (2-3 clicks)
  - **ALGN Gun Tilt**
  - Make filament image brightness symmetrical (**Multifunction**)
- Gun Shift
  - **ALGN Gun Shift**
  - Spot size 5
    - center beam with Cond Shift (**X-Y** control)
  - Spot size 1
    - center beam with gun shift (**MF** knobs)
  - iterate
- Beam tilt pivot points
  - focus beam, center with Shift **X-Y**

- **Pivot X**
  - compress & align beam to a condition of minimum vibration (**MF knobs**)
- **Pivot Y**
  - Same correction as X-axis (**Multifunction**) Leave **ALGN**
- Intermediate lens astigmatism
  - **D**
  - underfocus C2
  - underfocus Ob **Focus** to obtain the *caustic image*
  - using **STIG-Diff** (**MF knobs**), obtain a symmetrical triad image

## Imaging System

- high-voltage center
  - select the highest magnification you plan to work at
  - center beam with Shift **X-Y**
  - find two-dimensional specimen feature and **Focus Ob**
  - defocus Ob as much as possible
  - **ALGN-Rot Center-Current**
  - turn on HT **wobbler**
  - align beam tilt (**MF knobs**) to minimize the movement of the feature in the center of the screen
- Objective lens astigmatism
  - coarse alignment

- select moderate magnification
- remove Ob aperture
- **STIG-Obj**
- observe bright and dark contours of object features move apart as you go through Ob focus
- align stigmators such that bright and dark contours exactly overlap in Ob focus (**MF** knobs)
- fine alignment (still in **STIG-Obj** mode)
  - locate specimen region with amorphous structure (e. g. amorphous edge)
  - remove Ob aperture
  - focus Ob
  - choose high magnification ( $> 300\text{ k}$ ) and observe speckle pattern (use binoculars)
  - focus Ob to obtain contrast minimum
  - adjust stigmators to optimize contrast minimum
  - iterate
  - Leave **STIG** mode.